

# AI AUTOMOTIVE INDUSTRIES

OCTOBER 15, 1953

## NATIONAL METAL SHOW NUMBER

AUTOMOTIVE and AVIATION MANUFACTURING  
CIVILIAN AND DEFENSE  
ENGINEERING • PRODUCTION • MANAGEMENT

***In This Issue*** . . . New Lincoln-Mercury Plant . . . Light Alloy Panhard  
. . . Latest Equipment at National Metal Show . . .  
Growing Use of Die Castings . . . 1954 Dodge Models  
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A CHILTON PUBLICATION

# Heald Internal outproduces older equipment by nearly

# 2 to 1



This Heald Model 271 Gage-Matic grinds ring gear bores nearly as fast as two older machines.

**T**HIS might be just another case history, except for one thing — a production increase of almost 100 per cent. And that's a pretty important saving in any production man's language.

A Heald Model 271 Gage-Matic was installed by an automotive manufacturer for grinding the bore of differential ring gears. A simple, straightforward operation — yet it was found that this new Internal out-produced *two* older machines by almost two-to-one! Why? Because all of the new Heald machines have been designed to save time and effort on *every phase* of the operating cycle. It all adds up to a substantial increase in production efficiency.

Remember — when it comes to precision finishing, it pays to come to Heald.

Internal and Rotary  
Surface Grinding Machines  
and Bore-Matics



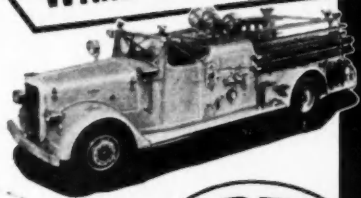
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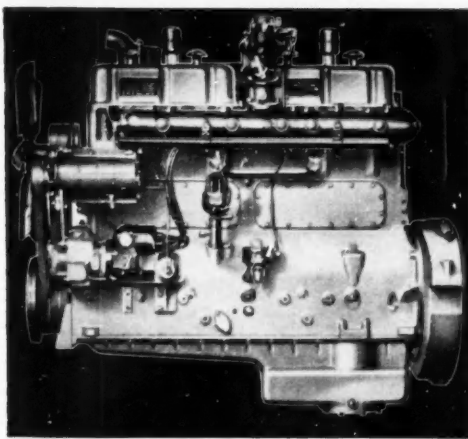
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## *When Nobody Knows the Answer*

One of these days you may come face-to-face with a metal problem that does not seem to have an answer.

That is the time to think of these International Nickel Company metallurgists. They are constantly improving and modifying nickel alloys to meet new conditions. They are always ready to help you with specific problems involving metals for destructive service conditions.

Over the past 50 years, Inco has developed a family of metals for hundreds of different applications. In one branch of the family, for example, is a group of heat-resisting alloys—Inconel®, Inconel "X"®, the Nimonic® Alloys and Incoloy®—all now important in high temperature work.

Elsewhere on the family tree, you will find other alloys—each with certain special characteristics. Often, there is a better-than-even chance that one of Inco's alloys offers exactly the properties you are looking for.

Of course, this does not mean that somebody at Inco can dip into the files and come up with a pat answer to every new problem. All the answers have not been found yet. But a tremendous amount of research has been done, and you can probably benefit in one way or another from it.

When nobody knows the answer, Inco's metallurgists keep going until they have investigated all possible metals and alloys that might

do the job. In fact, the men in Inco's Technical Service (and in their Corrosion Engineering and High Temperature Engineering Services, as well) have one primary goal: to help you determine whether an Inco Nickel Alloy or some other metal will serve your purpose best.

No matter what your metal-selection problem may be, all the technical facilities of Inco are available to help you solve it. There is no charge, no obligation of any kind. For prompt technical help whenever you need information about metals, all you have to do is get in touch with: "Technical Service,"

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# A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

## AUTOMOTIVE INDUSTRIES

OCTOBER 15, 1953

VOL. 109, NO. 8

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## Pangborn "Continuous-Flo" Barrel Cuts Blast Cleaning Costs More Than Half!

### "Before and After" at Lefere

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Operating cost per ton	\$1.25	60c
Quality of job	Mediocre	Good
Appearance	Dull	Sparkling
Safety	Fumes, acid hazard	No hazards
Convenience	Problem of protection, acid disposal	No problems
Maintenance	Expensive	Greatly reduced

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A key unit in this system is a Pangborn "Continuous-Flo" ROTOBLAST® Barrel. The Pangborn ROTOBLAST cleans 16 to 18 tons an hour . . . has cut cleaning costs over the pickling method formerly used from \$1.25 to 60c per ton! And, in addition to this great saving, the "Continuous-Flo" Barrel gives Lefere the bonus advantages listed at left.

**Get the Facts on Pangborn ROTOBLAST.** Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST machine to clean faster, better and cheaper. Bulletin 214 gives you full details. For your free copy, write: PANGBORN CORPORATION, 3900 Pangborn Blvd., Hagerstown, Maryland.

*Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment*

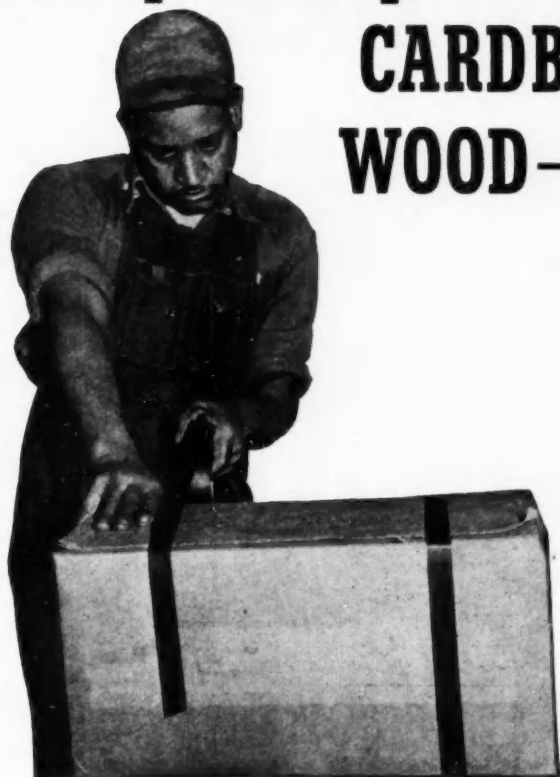
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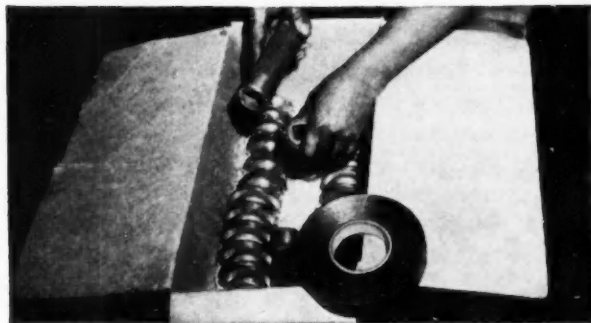
**with the right equipment for every job**



# Heavy metal parts now shipped in CARDBOARD instead of WOOD—thanks to new tape!



120-pound cartons are quickly, easily and neatly sealed for shipment with Polyken High Tensile Tape No. 360.



Polyken High Tensile Tape anchors steel feed rolls and sleeve parts for turning lathes inside cardboard cartons.

## New Polyken High Tensile Tape slashes shipping costs for Hawker Manufacturing Company

The Hawker Manufacturing Company of Dayton, Ohio, knew they could save important money if their steel lathe parts could be shipped in cardboard cartons instead of wooden crates. The problem was to find a satisfactory way to close and reinforce these cartons.

They tried banding, but the bands cut or crushed the cartons. Besides, the banding was hard to handle, bulky to store, and its application demanded special tools. The high tensile tapes they tried didn't hold. They split, rolled at the edges and didn't provide any resistance to weather.

Then Polyken introduced a new high tensile tape : . . the *only* high tensile tape with a plastic-coated cloth backing. Hawker used it, found it did the job with complete satisfaction.

Here's why new Polyken High Tensile Cloth-Backed Tapes can solve similar problems for you:

This is the only high tensile tape with non-split cloth backing—plastic coated to resist weather.

Excellent adhesive quality fuses tape to the carton without cutting or crushing—provides sure, lasting hold without creep or edge roll.

Application is fast—6 times faster than banding—and no special tools are needed.

The tensile strength: 240 pounds per inch of width.

New Polyken High Tensile Tape is now available in Gloss Black, No. 360, for regular packaging applications and NON-STAINING Gloss White, No. 361, where a protection from staining is required.

This is just another example of the way business is finding new money-saving uses for the new Polyken tapes. Use the coupon for samples and complete information.

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## "ALODINE" PROTECTS BOTH PAINTED AND UNPAINTED ALUMINUM

"Alodine" forms an amorphous non-metallic surface on aluminum which is thin, tough, durable, continuous with and a part of the basis metal. The "Alodine" film (or skin) anchors paint, prolongs paint life, and protects aluminum exposed unpainted to the atmosphere.

### ALODIZING IS EASY AND EFFECTIVE

The Alodizing process is a chemical one and does not require electrolytic techniques or equipment. Alodizing is simple, fool-proof, low in cost, and requires a minimum of equipment. Essentially, the process consists of the following easily controlled operations or steps:

1. Cleaning the work.
2. Rinsing the cleaned aluminum surfaces.
3. Coating with "Alodine."
4. Rinsing with clean water.
5. Rinsing with warm "Deoxylyte" (acidulated rinse).
6. Drying.

**AFTER TREATMENTS:** Alodized aluminum provides an ideal bonding surface for paint, wax, adhesive, or other organic finishes. These should be applied in accordance with the manufacturer's directions. Unpainted or exposed areas will be protected by the tough, durable "Alodine" skin.

### "ALODINE" MEETS SERVICE SPECIFICATIONS

"Alodine" applied by immersion or spray complies with the rigid performance requirements of both industrial and Government specifications. The following is a list of Service Specifications which "Alodine" meets.

MIL-C-5541	U.S. Navord O.S. 675
MIL-S-5002	16E4 (SHIPS)
AN-E-19	AN-C-170 (See MIL-C-5541)
AN-F-20	U.S.A. 72-53 (See AN-F-20)

AUTOMOTIVE INDUSTRIES, October 15, 1953

# The PROTECTION of ALUMINUM



Drawing courtesy of Piasecki Helicopter Corporation, Morton, Pennsylvania

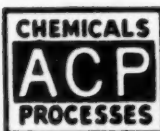
**T**HE H-21 Piasecki Tandem Helicopter—the "Work Horse"—is ideally suited for rescue work in areas inaccessible by other means, and in all kinds of rough weather.

For durable paint adhesion and high corrosion-resistance aluminum parts of the "Work Horse" are Alodized. The "Alodine" protective coating chemical bonds paint, extends paint life, and protects unpainted aluminum.

Because of its economy, effectiveness, and ease of application, the Alodizing process is finding wide-spread use in the aircraft field and in other industries fabricating products of aluminum.

**Alodized aluminum meets the requirements of Military Specification MIL-C-5541. Write or call for coating and process data on "Alodine".**

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# HERE IS EXTRA INSURANCE AGAINST *demon dust*



UNITED SPECIALTIES PRE-CLEANER

Here are the pre-cleaner models available:

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Low Air Flow	550-B-16415	1 1/4 in.
	550-B-16420	1 1/2 in.
	550-B-16425	2 in.
	550-B-16430	2 in.
High Air Flow	550-B-16435	2 1/4 in.

*Under extreme dust conditions, oil bath air cleaners on tractors, power units and agricultural implements need cleaning after only a few hours' operation — or less. Often these cleaners are not serviced in time, and engine damage results. Here is where the United pre-cleaner comes to the rescue. This efficient unit removes the bulk of dust and chaff before the air reaches the oil bath air cleaner.*

## Look at these advantages:

**Reduces Air Cleaner Servicing Frequency —**  
Because pre-cleaner removes so much air-borne dust, the air cleaner itself requires much less frequent servicing . . . saves oil.

**Transparent Plastic Dust Chamber —** Dust level in pre-cleaner is always visible — a reminder to empty when full.

**Fits Most Air Cleaners —** Designed to fit practically any center tube air cleaner, the United pre-cleaner is adaptable to 95 percent of all wheel tractors, agricultural equipment and industrial power units.

**Easily Attached —** Pre-cleaner can be quickly fitted over the intake horn of the air cleaner.

## Licks Bean Fuzz, Other Crop Lint and Dust

Here is the practical answer to the fuzz and lint encountered while harvesting beans, etc. United pre-cleaner removes a large percentage of the fuzz that formerly entered the air cleaner and quickly clogged it.

We invite your inquiry regarding the pre-cleaner or any of the many United Oil Bath Air Cleaner designs.

## UNITED SPECIALTIES COMPANY

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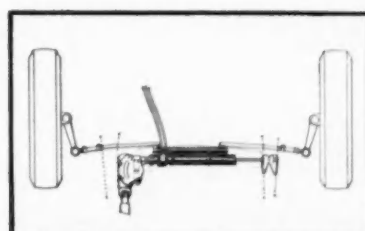
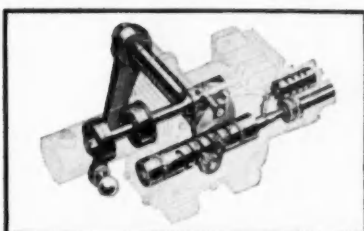
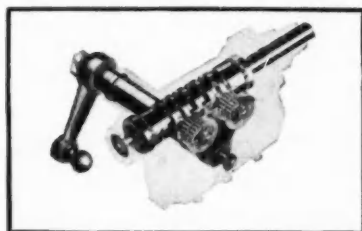
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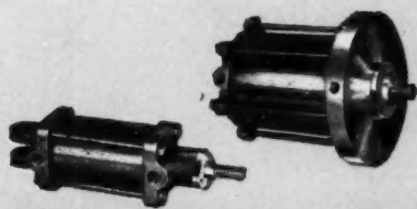
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Bulletin 210



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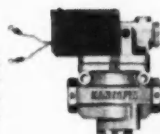
Piston-operated poppet design. Exclusive replaceable cartridge for easier maintenance. Speeds to 600 cycles per minute. Pressure from 15 to 150 p.s.i. Integral, solenoid-controlled pilot heads or a choice of 10 separate pilot valves for remote control.

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- Maximum Interchangeability
- No Springs in Main Valve

Write for Bulletin 231.

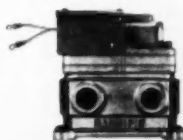
### 2 and 3-Way Valves.

Same valve operates 2-way or 3-way, normally open or normally closed.  $\frac{3}{8}$ " to  $1\frac{1}{4}$ " I.P.S.

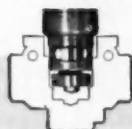


### 4-Way Valves.

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges.  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ " I.P.S.

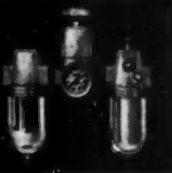


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Write for Bulletin 57-W



Hannifin "Directair"  
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air-operated disc valve

Foot-operated  
treadle valve  
(Also spring return  
and rotary types)



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control valve  
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# Conomatics demonstrate carbide tools

We believe you know that not every "automatic" job can be tooled successfully with 100% carbide. What we think you may not know is that the Conomatic Carbide Development program is making progress with such jobs. This relatively new Cone service is convincing to those who like to be shown that "it can be done".

Granted that experimental runs are not production runs, it has often been proved that under actual production conditions they have developed into production runs. A number of conditions must be met in the successful use of any tooling material. Carbide is no exception. If the comparisons of 100% carbide and HSS runs indicate as much gain as per the job illustrated, the reward is worth the effort.

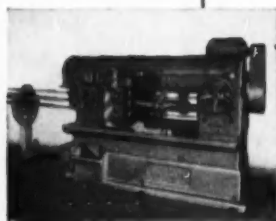
For full particulars please consult your Cone Representative or inquire direct.

**MATERIAL—EVERDURE:** (96% copper, 3% silicon, 1% manganese) Hole drilled with 17/32" drill to 1½" depth; thread rolling of ½" pipe thread.

	HSS	CARBIDE
Cycle Time	35 secs.	15 secs.
Work Spindle Speed	420 R.P.M. at 124 S.F.	850 R.P.M. at 250 S.F.
Tool Wear	2000 pcs. per grind	5000 pcs. per grind

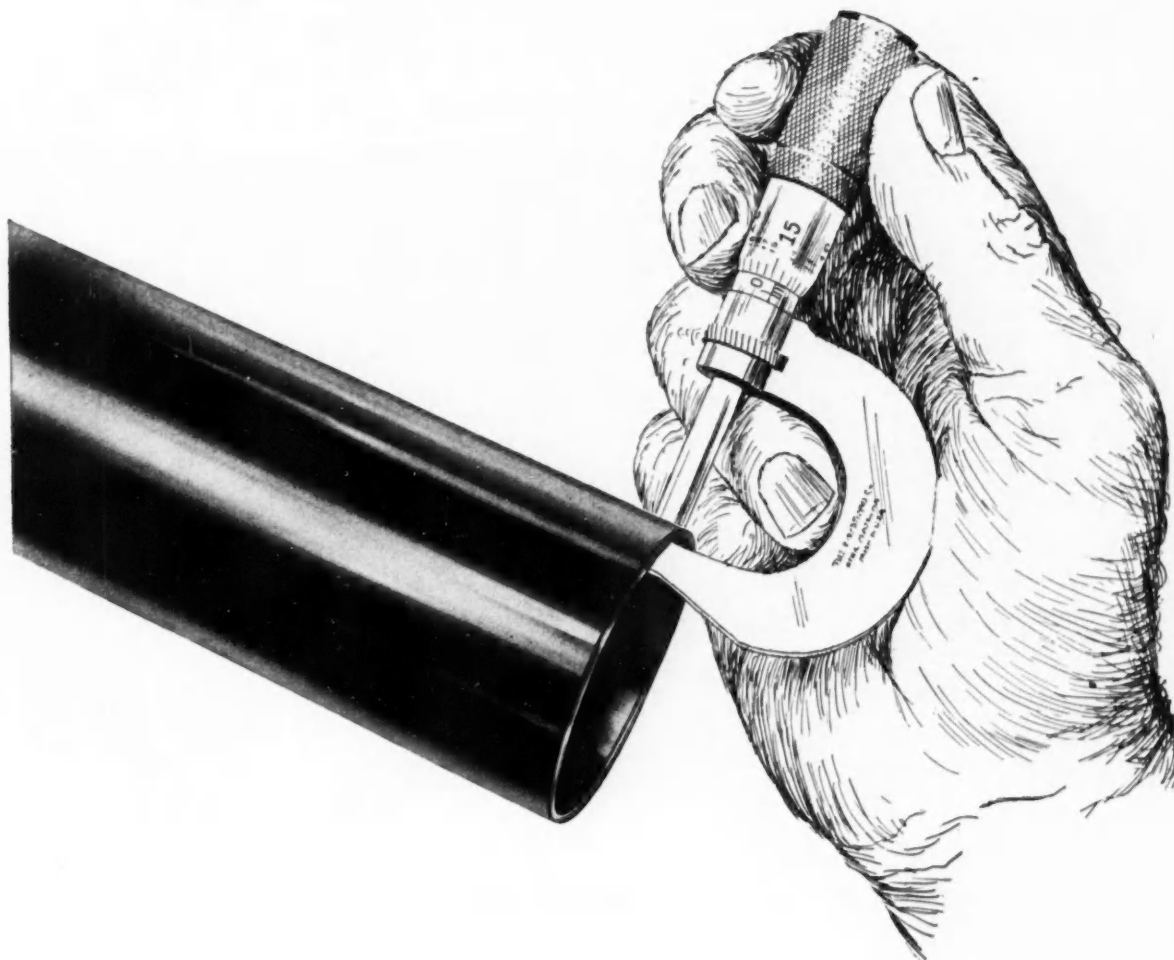


The CONOMATIC is the ONLY representative of Frame "A". The short, "weave-proof," upright members, secured between larger and heavier top bed and base, make possible the strongest type of bridged support to the tooling area and its "work and tool axis."



# Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.





*It has to be accurate  
...it's welded tubing*

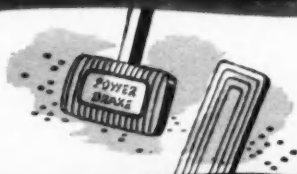
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## Specified by More Car Manufacturers Than Any Other Make

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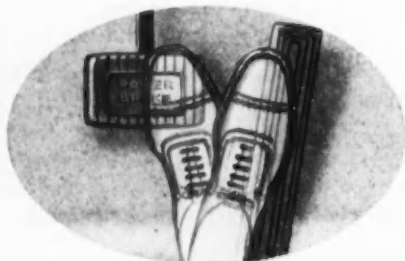
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For any car manufacturer interested in adding a big plus to his sales story, the Bendix Low Pedal Power Brake is the answer.

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NOW *Stopping*  
IS AS EASY AS *accelerating*



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LESS FATIGUE AND GREATER SAFETY

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*Complete Table of Contents, Page 3*

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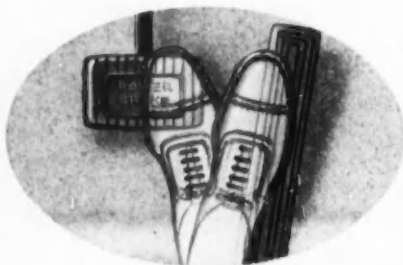
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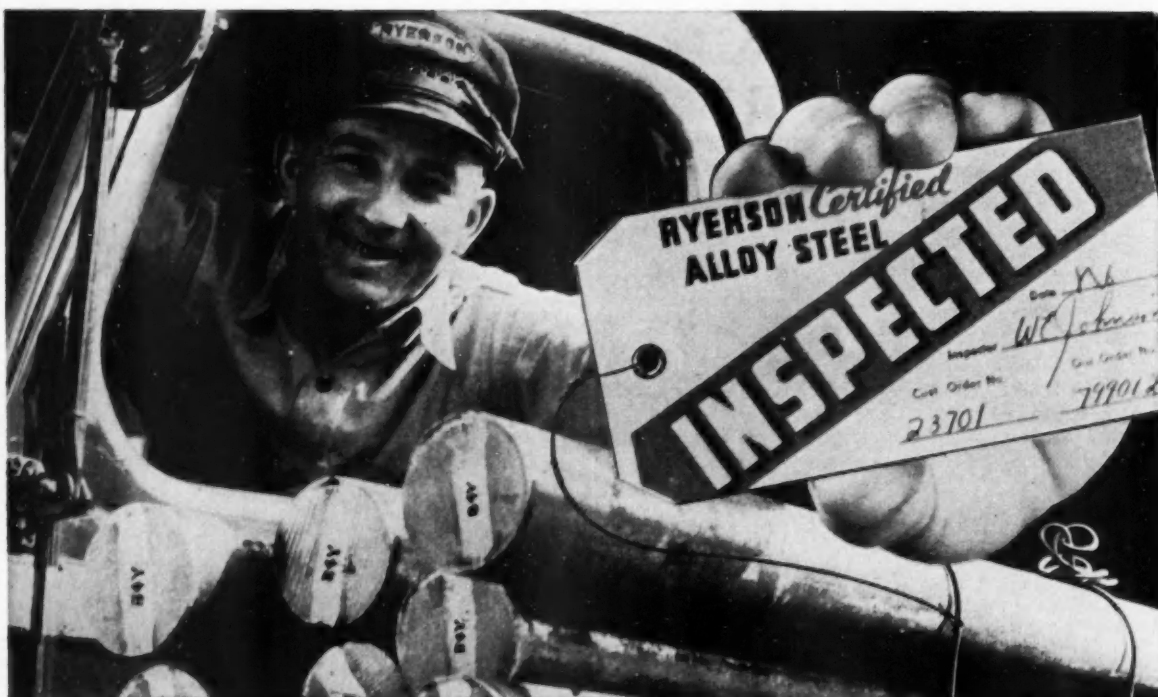
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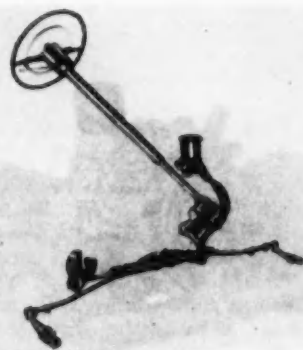
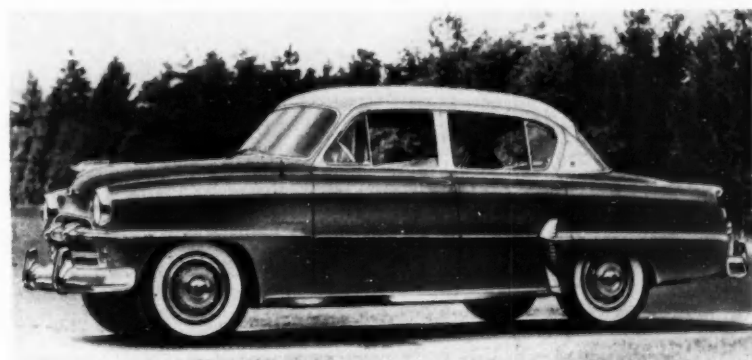
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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 109, No. 8

October 15, 1953



## PLYMOUTH FOR '54 OFFERS POWER STEERING

Increased length, modifications to exterior and interior styling, silicon chrome intake valves, higher capacity oil pump, and improved clutch characterize the new Plymouth for 1954. Three series with 11 body types are offered. Instrument panels have a non-glare textured

finish. Hy-Drive torque converter provides maximum torque increase of 2.6 to 1. The linkage type power steering option has a rotary oil pump connected to the generator. The same power unit is offered on the Dodge Six, described elsewhere in this issue.

### Year's Car Production to Pass Six Million

It now looks as though passenger car production this year easily will top six million and may go as high as 6.3 million. Up to Sept. 20 production already had passed 4.66 million and even if production should average only 100,000 a week for the rest of the year the total would be more than 6.1 million.

Most optimistic forecast heard on sales this year comes from J. C. Doyle, Ford sales and advertising manager. He forecasts sales of about six million cars and one million trucks this year. Sales through July totalled more than 3.4 million, leaving 2.6 million to go for the past five months, or an average of 520,000 a month. Even if that average is not maintained, this year certainly should wind up with at least 5.5 million new cars sold for the second best sales and production year in history.

An inescapable conclusion from a survey of the new car market is that prewar ratio between the Big Three and the independents is rapidly re-

turning. After several abnormal war years which saw the independents taking a much larger than normal slice of industry sales because of restrictions on production, the Big Three now are again taking about 90 per cent of the market. For the first seven months of this year the independents accounted for 10.2 per cent compared with nearly 14 per cent for the same period a year ago. The figure might have been even lower if Ford had not run into difficulties during May and June.

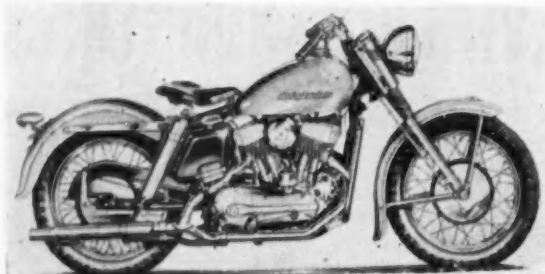
### Surveys Vary on Five-Year Market

Surveys looking at the passenger car market over the next few years vary widely in their predictions. One national survey recently pegged the market at about 4.8 million units a year over the next five years or so. At the other end of the scale is a prediction of nine million new cars a year within a few years made by A. O. Dietz, president of CIT, Inc., large independent sales finance company. There are other predictions falling between these two extremes.

In general, there appears to be agreement that the market next year will fall off from 10 to 15 per cent below this year's high level, which would indicate sales in the neighborhood of 5.2 million for 1954. However, some leaders in the industry also believe that the upward trend will resume in 1955 and that forecasts of eight to nine million new cars a year by the early 1960's are not at all out of reason. Certainly the expansion of production facilities by the large automobile makers indicates without doubt that they are looking for an eventual market somewhat beyond current production capacity.

Ford is basing its optimistic expansion program on four major points. They are: A 53-million-plus vehicle national fleet, of which 12.5 million are prewar units needing immediate replacement; a steady population increase with 170 million expected by 1960 and 177 million by 1965; formation of new households at the rate of one million a year; and national disposal income currently at \$245 billion after taxes and expected to expand continually during the next decade.

# News of the AUTOMOTIVE



## FIFTY YEARS OF CYCLES

The new version of the Harley-Davidson model KH features the introduction of the firm's golden anniversary models. The KH features a larger 55 cu in. engine with a seven-plate clutch and larger sprocket assembly.

## Troubles Curb Output of High Priced Cars

When passenger car sales are running into the stiffest competition in the postwar period, highest priced cars, strangely enough, may be in short supply temporarily. Lincoln and Cadillac both have been seriously hit by the lack of Hydra-Matic transmissions, and Chrysler has been forced into limited production because of the stretch-out of 1953 models caused by the tool and die strike. Packard also has suffered a slowdown in output for the same reason.

There is a very definite and determined drive by Chrysler Div. to carve out for itself a much larger share of the luxury car market than it has enjoyed hitherto. A separate production line has been set up for the Imperial models and advertising effort is noticeably directed toward individualizing the Imperial as a luxury car. Like Packard, Chrysler is tending to separate its luxury cars from its volume models to set them off in a class by themselves.

## Corvette Price Set

The Chevrolet Corvette sports car, now in limited production, is being distributed at the factory level on a "buyer prestige" basis. Advertised delivered price is \$3,490, including handling and federal excise. The car is fitted with Powerglide with a modified engine giving 150 hp. Standard equipment includes vacuum booster windshield wiper and washer, direction signals, white sidewall tires and simulated knock-off wheel disks, built-in radio antenna, electric clock, courtesy lights, lighter, parking brake signal, outside rear view mirror, and fuel filter.

## Merger Plans Heard Between Nash, Hudson

Exploratory talks are under way between Nash-Kelvinator Corp. and Hudson Motor Car Co. regarding some type of combined operation. Presidents George W. Mason of Nash and A. E. Barit of Hudson last week refused to confirm or deny the possibility, although reliable reports indicated an evaluation of Hudson property was being made.

Either outright purchase of Hudson by Nash, or agreements to make interchangeable parts were indicated as possible alternatives by Mr. Mason. Mr. Barit declared the identity of Hudson would be preserved should any merger take place.

## Hudson to Extend Power Steering

Hudson, first company to use the GM linkage booster type power steering, also is planning to adopt the Monroe unit for its lower priced lines. Hudson also soon will announce adoption of the Borg-Warner automatic transmission. The unit is essentially the same one used by Studebaker, incorporating torque converter, two stage planetary gear set, and direct clutch.

## Ford-Chevrolet Race Hits Other Rivals

There is a good deal of concern among dealers in the lower priced lines over the current sales fight between Ford and Chevrolet. The battle is rough enough this year, but is considered something of a warm-up for the really big fight expected in 1954. Particularly concerned are the independents who already are feeling the effects as innocent bystanders.

## Improved Hydra-Matic Under Development

A new improved Hydra-Matic transmission is expected when General Motors starts production at the new plant to be built at Livonia, Mich., to replace the one which burned there Aug. 12. The new unit has been under development and reported near the tooling stage at the time of the fire. Details are still very confidential but it is understood that it will be much smoother in operation. GM has not released its time table but it is expected that the new plant will be completed and ready for production in about a year.

Predictions of an industrial miracle by General Motors in getting back to production of Hydra-Matic transmissions have been borne out. GM started turning out Hydra-Matics at its Riopelle plant in Detroit the first week in October, about eight weeks after fire destroyed the transmission plant at Livonia. The Riopelle operation, using parts made by hundreds of subcontractors, is the first step in GM's program. Operations at Willow Run will start the first week in November with full output at 200 Hydra-Matics an hour expected about mid-December. Initial production is slated for non-GM users who still want the Hydra-Matic.

Lincoln expects to stay with Hydra-Matic drive and will resume production in November on 1954 models with transmissions supplied from the GM Riopelle plant operation. Lincoln was attempting to adopt Merc-O-Matic but apparently found the job could not be done readily. Whether Nash will stay with Hydra-Matic is uncertain. The company is reported to be dickering for the Borg-Warner drive but no decision has yet been made.

## Tubeless Tire Option

Tubeless tires as standard equipment on passenger cars still are some distance away. One independent, however, will offer them as optional equipment on 1954 models. Car makers have been looking at tubeless tires but apparently the big stumbling block at the moment is their higher cost.



# AND AVIATION INDUSTRIES

## **Detroit Car Dealers to Revive Auto Show**

The Detroit Automobile Dealers Association will hold its first automobile show since 1940 next Feb. 20 through 28. It will be held at the State Fair Grounds, where 150,000 sq ft of space in four adjacent buildings is available. All manufacturers will be represented at the show, which will include an elaborate stage production. The dealers look at the show as a kick-off to the large spring selling season.

## **Competition Revives 2-Year Style Change**

Competition apparently is dooming major styling changes every three years. In the postwar era car makers have been on the three-year cycle on the basis that greatly increased tooling costs made the normal two-year prewar pattern uneconomic. However, intense competition is sure to bring it back with most companies who made major changes last year getting completely new models ready for 1955.

## **Fire Loss \$80 Million**

Latest estimates put the cost of the General Motors Hydra-Matic plant fire at \$80 million. The fire also is estimated to have cost the corporation production of somewhere between 75,000 and 100,000 vehicles.

## **Ford to Employ 3-D**

Ford Div. has obtained exclusive rights to CinemaScope and will use it to introduce its 1954 cars and trucks. The Ford contract gives the company exclusive rights to the 20th Century-Fox wide screen process in the motor industry through 1954.

## **Tax Committee Formed**

An Industry-Wide Excise Tax Committee has been formed in Cleveland to coordinate activities of the rebuilding segment of the automobile industry in obtaining relief from federal excises. Supporting associations include Automotive Engine Rebuilders Association, Automotive Parts Rebuilders Association, Motor & Equipment Manufacturers Association, Na-



## **HUDSON JET FOR 1954**

Three series are offered by Hudson in the Jet line, in two and four door models. A utility sedan has a removable rear seat for greater luggage room. Four rear axle ratios are offered, when Hydra-Matic is available. Peak power is increased to 114 hp with Twin H-Power and 8 to 1 compression ratio aluminum head combined with a new combustion chamber design.

tional Automotive Parts Association, and National Standard Parts Association. Counsel has been retained, and copies of testimony before the House Ways and Means Committee in August have been mailed to members.

## **Ford Worker Suggestions Net \$1.76 Million**

Employee suggestion plans run into sizable figures in the automobile industry. Ford reveals that in the six years its plan has been in operation employees have earned nearly \$1.76 million in awards, with 144 maximum awards of \$1,500 being paid. Four persons have received the top awards twice. Since 1947, 35,443 awards have been presented. The highest individual record is \$6,891 paid to an employee who had 19 of 150 suggestions submitted accepted. Another employee has submitted 690 suggestions, and won awards of \$1,113.

## **Dutch Firm to Build Willys Vehicles**

Willys passenger cars and commercial vehicles will be assembled in Rotterdam to supply European and African markets. The units will be assembled by Nederlandsche Kaiser-Frazer Fabrieken M.V. of Rotterdam, formed jointly by K-F and Dutch interests in 1948. The plant is being enlarged to accommodate the expanded production of the Willys line.

## **Packard Jet Engine Contract Clarified**

Packard has received clarification about its J-47 jet engine contract which the Air Force recently announced would be cut back. During the remainder of this year production will remain at current levels but will be reduced to a lower rate starting next January and continuing until the middle of 1955, when the job presumably would be terminated. Packard also reports that it has pending possible other contracts for the Air Force.

## **Tank Stretchout**

Plans for a stretchout of tank production at the Chrysler Delaware Tank Plant, assuring continued operation of the plant through 1954, were announced recently. The plans, drawn up by the Chrysler officials, were approved by Army Ordnance in Detroit. Under the new program, a tank modification depot now under construction in Newark by Chrysler for the Army will be completed and used for storage of suppliers' machine tools. Processing and modification of tanks, previously planned for the depot, will be carried on in the tank plant in conjunction with the stretch-out of tank production. Earlier plans had called for a complete close-out of tank production at the plant by April, 1954.

# News of the AUTOMOTIVE

## **Air Conditioning Set for Low Priced Field**

At least one of the Big Three volume lines next year is expected to offer air conditioning. It may not arrive at new model time but will be ready some time after the first of the year. Good progress is being made by automotive engineers in developing a compact combination heater and air conditioner lower in cost than two separate units. One manufacturer expects to have such a unit ready for 1955 models.

## **Kaiser to Resume**

Kaiser Motors apparently is very near to resuming production of automobiles at Willow Run, halted last June 26. The company has reached agreement with the union over a new working contract which would contain three important concessions demanded by Kaiser management. These would reduce the number of full time stewards from 95 to 27, consolidate certain job classifications providing more flexibility of assigning workers to different types of jobs and grant more latitude for management in applying existing overtime rules.

## **Rockwell Spring Shifts Offices to Coraopolis**

Rockwell Spring and Axle Co. has set up its headquarters at Coraopolis, Pa. The new headquarters location is at the site of the Standard Steel Spring Co., which merged with Timken-Detroit Axle Co. recently to form Rockwell Spring and Axle Co. Col. Willard F. Rockwell, who formerly headed both companies, will continue as chairman of the new corporation. New president and chief executive officer is Robert C. Enos, president of Standard Steel Spring Co.

## **Tractor Output Off**

Caterpillar Tractor Co. is reducing production to bring inventories of finished machines and parts into line with normal levels. The company does not indicate the percentage of production cut but is laying off 1500 of its 26,000 employees at its Peoria works.



## **FITTING OLDS DYNAFLOW**

*Installation of the Dynaflo transmission in the 1953 Oldsmobile required changes in the rear flywheel housing, bearing retainer extension, prop shaft, bell housing, thrust bearing hub, rear motor mount brackets and transmission rear support bar assembly, throttle linkage, shift lever, and addition of cooling hoses.*

## **Keller Back at Chrysler**

Guided missiles development is sufficiently well advanced to warrant closing of the Defense Dept. guided missiles office, according to K. T. Keller. Keller recently resigned as director of the office to return to his post as chairman of the board of Chrysler Corp. His work, he says, can be handled in the "regular administrative and planning" offices of the military establishment, now that there are "several guided missiles already in production, others relatively far advanced . . . and some in the early stages of research."

## **English Sports Cars Cost Less, Go Faster**

Price reductions on several British passenger cars began last month with the Jaguar XK-120 on six coupe and convertible models sold in the U. S. An \$889 cut on the modified open two-seater to \$3545 was the maximum, with a \$190 cut on the hardtop coupe the minimum. In England, reductions of about 10 per cent in Nuffield and Rootes Group makes were followed by announcement of a new Ford model to replace its lowest-priced Anglia, at about \$1100 including tax, or \$140 less. Austin prices were lowered recently on two medium-priced models, the Somerset Saloon and the Herford, by some \$70 and \$115 not including tax.

Time trials at the Bonneville Salt Flats, Utah, last month proved the opportunity for the Austin-Healey Hundred sports car to claim a record for production cars of 142.6 mph. In two races recently Jaguar coupes won against American cars for European victories in such events. At a new Watkins Glen, N. Y., course hastily adopted last month the winning Jaguar averaged 76.1 mph. At a west coast dirt track recently a Jaguar overcame a seven-lap lead to take a 250-mile stock car race, averaging 80.9 mph.

## **Dodge Sets Records**

Dodge V-8 passenger cars succeeded in breaking a total of 196 AAA stock car records in recent runs at Bonneville Salt Flats, Utah. Included was the fastest time ever recorded by the AAA for a standard American car, 108.36 mph.

## **Ford Starts New Office Building**

Ford has started construction of a new administration building in Dearborn. Originally the building was scheduled for construction two years ago but was delayed because of the Korean War. When completed sometime in 1955 it will house all central staff offices of the company now located in the administration building. Lincoln-Mercury Div. will take over the offices vacated by the central staff.

# AND AVIATION INDUSTRIES

## Community Relations Theme of GM Book

General Motors, in line with its community relations program, has prepared and is distributing a new guide book to help its personnel throughout the country maintain and improve GM's public relations position. The 32-page book entitled "General Motors Lives Here" consists primarily of case histories showing how various GM units have built good relationships in their local community. It includes such examples of heating a local hospital during a coal strike, grading and equipping playgrounds, construction of baseball diamonds, furnishing trucks for local salvage campaigns, lending technical assistance on hospital design and construction, and many other similar activities.

## Yale & Towne Plans Lift Truck Leasing

Under a new program established by Yale & Towne Mfg. Co., installment buying or leasing of industrial fork lift trucks is made available to users of this type equipment. The Towne sales plan provides for payment over periods of as long as 36 months. The leasing plan is devised for concerns which prefer to rent rather than to buy the lift trucks outright.

## Rubber Use Jumps

Goodyear engineers have come up with some interesting data about the greatly increased use of rubber in passenger cars since 1920. The survey shows that the number of rubber parts used in the average car has increased from 150 to about 540. Total weight of all rubber used has increased to 100 lb from 33 lb, excluding tires and tubes, which account for 138 lb. Greater rubber use is attributed to larger floor mats, foam rubber seat cushioning, heater hose, automatic transmissions, power steering, and many other parts. These items account for an increase of approximately 45 lb. An additional 23 lb is attributed to extensive use of motor mountings and generally more vibration insulation.



## LARGEST HELICOPTER UNVEILED

The Piasecki YH-16 transport helicopter, the Transporter, can carry 40 troops, 32 litter patients, or three jeeps. The twin engine tandem rotor craft now has P&W R2180 engines of 1650 hp, will have two Allison T38 shaft turbine engines in production version. A commercial version would carry 48 to 72 passengers. Optional tail landing gear is available to sling a cargo pack beneath the fuselage.

## Motor Wheel Building New Defense Plant

Motor Wheel Corp. will build a new plant at Lansing, Mich., to build cartridge cases for 106 mm recoilless anti-tank rifles. Cost of the plant and equipment will be approximately \$2 million. Motor Wheel recently was awarded a \$3 million contract by Army Ordnance to supply the cartridge cases. The new plant is expected to be in production by next summer and to employ about 300 persons. Motor Wheel currently has defense contracts for mortar shell casings, truck wheels, hubs and drums, and tank wheels.

## Euclid to Operate as GM Subsidiary

General Motors, in announcing it has completed acquiring all outstanding stock of Euclid Road Machinery Co. of Cleveland, has cleared up speculation about where it will fit into the GM organization. Euclid will be operated as a wholly-owned subsidiary, which rules out the previous conjecture that it might be integrated with GMC Truck and Coach Div. Existing Euclid management will continue under the direction of Raymond Q. Armington, president and general manager, reporting directly to C. R.

Osborn, General Motors vice-president in charge of the engine group.

## Thompson Products Backs New Electronics Firm

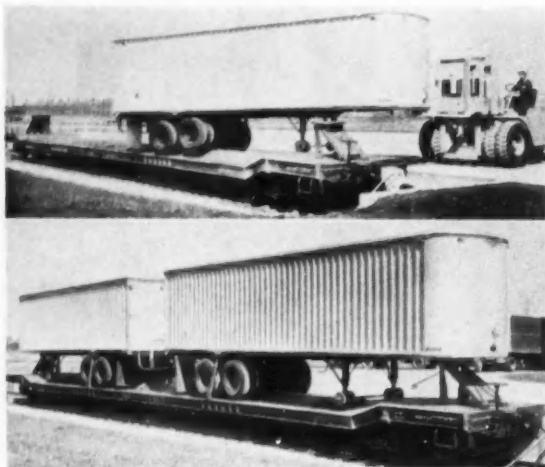
Thompson Products, Inc., is supplying financial backing for a new West Coast company being formed for research, development and manufacturing in the field of advanced electronics and guided missiles. The new company, Ramo-Woodridge Corp., will be located at Los Angeles and will be headed by engineering research and production personnel from Thompson Products and Hughes Aircraft Co.

The firm was awarded a \$330,000 contract for development of electronic techniques for automatically planning and controlling the purchase, storage, and flow of raw materials and parts to modern factory assembly lines. The work will be conducted to develop new techniques applicable to the business of Thompson Products.

## Boat Show Crowded

Space in the 1954 National Motor Boat Show has been over subscribed by 20 per cent, according to reports. Described as the golden jubilee show, it is to be moved to the Kingsbridge Armory in the Bronx, N. Y. next Jan. 15-23.

# News of the AUTOMOTIVE



## RAIL TRAILER

A 75-ft flatcar designed to haul two semi-trailers is the latest development of the Electro-Motive Div. of GMC. Side loading from level platforms in larger cities is feasible, says the division. Stanchions engage the trailer kingpin and allow 4 1/2 in. of lengthwise movement.

## International Nickel Perfects New Process

International Nickel Co. of Canada, Ltd., has perfected a new process for recovering iron ore from low grade nickel ore on an economic basis. The new method developed by the company's research staffs concentrates the ore to eliminate silicate rock. The nickel iron sulphides remaining are separated by the new process to extract the nickel and convert the sulphide iron into iron oxide ore containing approximately 65 per cent natural iron. A new \$16 million plant will be built in the Copper Cliffs area of Ontario and is expected to yield about a million tons of high grade iron ore annually in addition to the nickel recovered.

## Barrett-Cravens Plans New \$1 Million Plant

Barrett-Cravens Co. has started construction of a 150,000 sq ft plant at North Brook Hill near Chicago to cost approximately \$1 million. The new plant will combine manufacturing operations of two of the company's Chicago plants plus part of the operations of Crescent Truck Co., a subsidiary at Lebanon, Pa. The company's engineering department and general offices, as well as operations of Barret Electronics Corp., a newly established subsidiary, will be centered at the new plant.

## Coach Plant Renamed

The school coach manufacturing plant of Superior Coach Corp., at Kosciusko, Miss.—formerly known as the Pathfinder Div.—has been renamed and will now be known as Superior Coach Corp., Southern Div.

## Canadian Orders

Orders placed by the Canadian Department of Defence Production during the last half of August for automotive equipment totalled \$190,000. Largest orders were for trucks from Chrysler Corp. of Canada Ltd., Windsor, for \$59,160, and from General Motors Products of Canada Ltd., Oshawa, for \$61,300 for engine assemblies and trucks.

## Bosch License

Through a licensing agreement reached between American Bosch Corp. of Springfield, Mass. and Simms Motor Units, Ltd. of London, England, the latter company has been granted the British manufacturing rights for certain American Bosch diesel fuel injection equipment.

Under the terms of the agreement Simms is permitted to produce all new types and sizes of injection pumps and nozzles in the Diesel line of the American firm. It is said however that a small injection pump of the distributor type is the principal product currently being considered for manufacture in England.

## Willys is Major Tinkertoy Supplier

Disclosure was made recently of the part Kaiser Electronics Div. of Willys Motors, Inc., has made under the direction of the Navy Bureau of Aeronautics and the National Bureau of Standards in constructing machines to mass produce certain types of electronic components and assemblies.

Labeled Project Tinkertoy, the machines, which are the property of the Government, produce basic electronic components in completely assembled packages. The packages are made in an infinite variety of circuits that can be incorporated into the design of military or commercial electronic equipment in such a manner that operational characteristics are improved. Maintenance time, space and weight requirements also are reduced.

The Kaiser Electronics Div. is presently operating the machines in a pilot line at a government-owned facility in Arlington. The assemblies being turned out under a Navy contract are used by Kaiser Electronics' Nashua, N. H., plant to analyze the production capabilities of the Tinkertoy process for classified electronic equipment.

The Electronics Div. of Willys Motors at Toledo, an affiliate of the Kaiser Electronics Div., also is producing military and commercial electronic equipment at its plants in Anderson, Ind. and Toledo.



United Press

## UNIQUE OPENING

Latest Mercedes features a grille and hood welded into one piece, which reveals more than usual of the engine compartment and radiator.



# AND AVIATION INDUSTRIES

## Is Atom Plane Dead?

Lockheed Aircraft Corp. is now revealed as one of three plane producers holding Air Force contracts setting up a preliminary design study for a nuclear-powered aircraft. Both Boeing and Convair have undertaken similar projects for the Air Force. Their contracts were announced in the winter of 1951-52. In addition, General Electric and Pratt & Whitney are trying to develop nuclear-fission engines suitable for aircraft. It was assumed at one time that the GE engine was intended for Convair, while Pratt & Whitney has been working closely with Boeing.

Despite these efforts, there is no indication that Defense Secretary Wilson has changed his decision, announced last spring, that research on an atomic-engine plane could continue, but no actual aircraft would be assembled. Any such plane built now, Wilson said, would be too heavy and slow for practical use, presumably because of the weight of material needed to shield the crew from radiation. He suggested that scientific facts on nuclear-powered flight could be gathered in a "simpler, cheaper way."

## Light Transport Popular

The 100th Aero Commander light twin-engine executive airplane rolled from the production lines of the Aero Design & Engineering Co. at Oklahoma City, in August. Completion of the 100th Commander comes just 18 months after delivery of the first production model, latest version of which is now being produced at the rate of two airplanes a week.

## AEA Meetings

During the last half of October, the Automotive Electric Association is holding the last of 12 Regional Conferences which were scheduled for this year. The location and dates of these conferences are: San Francisco, Calif., Oct. 16 and 17, St. Francis Hotel; Portland, Ore., Oct. 22 and 23, Multnomah Hotel.

Sixteen manufacturer members of the association are participating, and their accounts in the different regions covered by the conferences will be in attendance.



## PLEBE IS 75-DAY WONDER

The Navy took delivery last month of the Temco "Plebe" primary flight trainer. Powered by a Continental O-470-13 engine of 225 hp, the 2500-lb aircraft will cruise at 171 mph, climb at 1350 fpm. It is competing with other models in evaluation tests. Innovations include tricycle gear, powered bubble canopy, maintenance and producibility features. First model flew 75 days after initial design was begun.

## Training Record Set

General Motors Institute announced a record first-year enrollment of approximately 900 cooperative engineering, business administration and dealer cooperative students for the fall semester. This brings the fall enrollment to approximately 2300 in the cooperative programs. Of the total, 1700 students will be enrolled in engineering, 200 in business administration and 400 in the dealer program.

The 1953 enrollment presages an anticipated enrollment of more than 2500 in 1954 when the current expansion program at GMI will increase

floor space by 40 per cent and provide facilities for the highest quality in engineering education.

In addition to the cooperative enrollment, the institute, serving as the central education and training service for General Motors, will provide plant management and technical training for General Motors divisional people and training in the area of distribution for people employed by General Motors dealerships to approximately 30,000 during the '53-'54 year.

Continued on Page 90

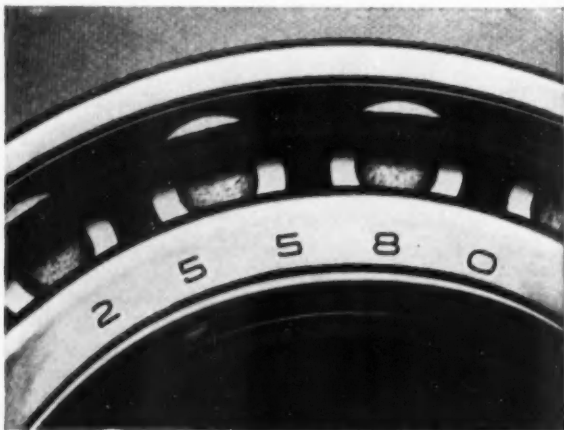
## 1953 MOTOR VEHICLE FACTORY SALES\*

	Passenger Cars	Trucks	Buses	Totals	
				1953	1952
January	453,319	111,599	254	565,172	375,410
February	486,071	96,740	190	583,001	435,216
March	566,320	134,129	236	700,685	482,973
April	596,633	126,754	145	723,532	529,585
May	549,677	93,443	367	643,487	503,917
June	587,549	74,063	380	661,992	516,710
July	599,134	105,622	376	705,132	511,729
August	513,457	101,478	451	615,386	270,982
Total—Eight Months	4,352,160	843,828	2,399	5,198,387	3,328,575

## 1953 MOTOR TRUCK FACTORY SALES BY G.V.W.\*

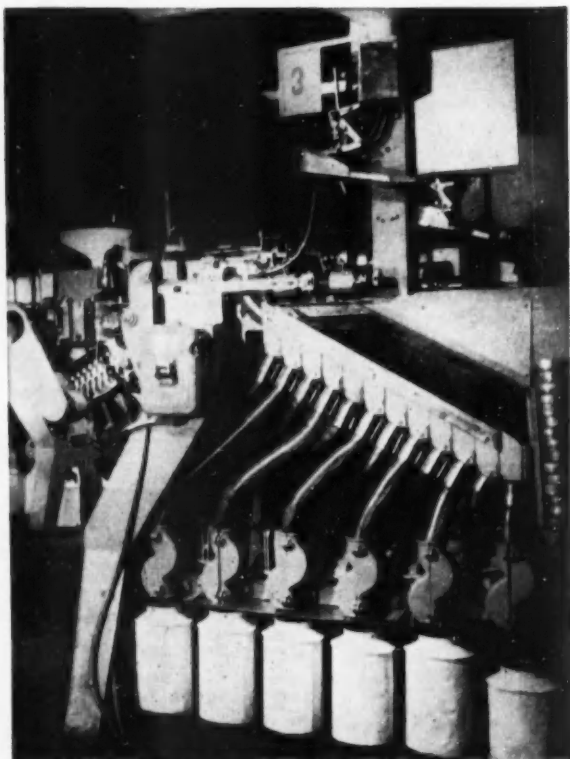
	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	53,077	21,481	4,087	16,333	3,950	8,788	3,905	111,599
February	45,121	16,279	3,413	13,305	4,267	8,255	4,080	96,740
March	59,951	25,153	6,159	22,962	5,618	9,503	4,783	134,129
April	55,652	25,680	5,770	21,005	5,187	8,856	4,604	126,754
May	43,812	16,293	3,580	13,379	4,823	7,900	3,656	93,443
June	33,297	11,628	2,169	10,102	4,549	8,217	4,101	74,063
July	51,318	16,687	4,220	15,786	4,231	7,635	3,753	105,622
August	47,684	18,611	4,241	15,599	3,850	6,930	4,363	101,478
Total—8 Mos., 1953	390,112	155,822	33,639	128,453	36,495	66,062	33,245	843,828
Total—8 Mos., 1952	277,593	142,293	36,697	145,862	33,235	66,669	31,662	738,031

\*—Automobile Manufacturers Association.

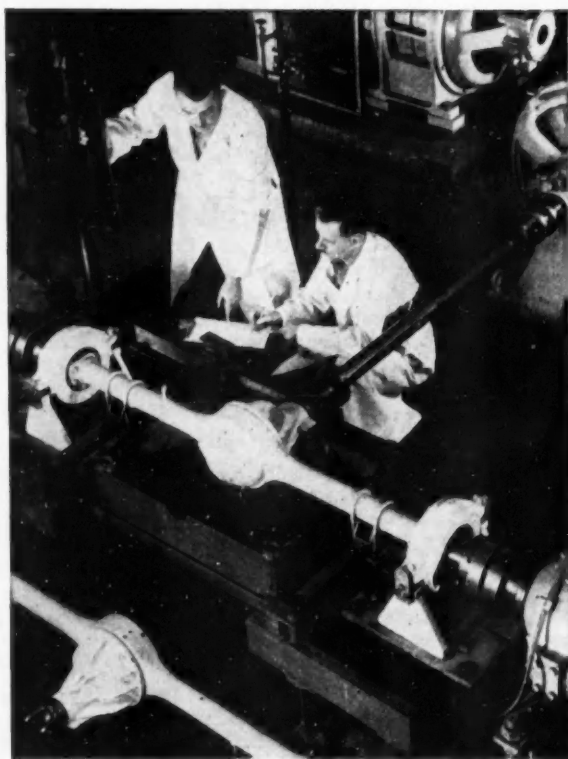


THE NUMBER 25580 on the bearing cone above—coupled with 25520 on the cup—identifies a certain size of tapered roller bearing commonly used on differentials. If you also see the name Timken, the number is a report, too, on the bearing's quality and the services that go with it.

# Know what this number adds up to?



WE'RE NOT SATISFIED just to grind and hone rollers to extremely close tolerances. This machine sorts them into even more precise sub-sizes so we can match rollers in each bearing to almost microscopic limits. Thus each roller carries the same load. This assures quieter operation, longer life. It's another extra step that makes Timken bearings the most accurate parts for your car's vital zone—the moving parts.



WE CONTRIBUTE RESEARCH on parts related to bearings that often helps improve their design. From recent studies, for instance, we are able to recommend a design change that improves rear axle bearing lubrication, makes the axle stiffer, less costly to produce. Specify "Timken" with the bearing number. And for full value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, O.

**TIMKEN is number 1 for VALUE where value counts most...in the vital zone**

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER ▷ BEARING TAKES RADIAL ⌚ AND THRUST — LOADS OR ANY COMBINATION —

# Men in the News



**Tinnerman Products, Inc.**—George J. Schad was promoted to president, succeeding A. H. Tinnerman, who is now chairman of the board.

**Campbell, Wyant and Cannon Foundry Co.**—Dr. Mark E. Putnam, executive vice-president of the Dow Chemical Co., was elected a director.



**Rinshed-Mason Co.**—Clyde R. Anderson has been appointed director of personnel and industrial relations.



**Wagner Electric Brake & Clutch Co.**—Kenneth Van Kampen has advanced to general superintendent.



**Bendix Aviation Corp.**—Rudolph F. Gagg recently joined the administrative staff which has charge of seven divisions.



**Midland Steel Products Co.**—Lewis F. McNitt has joined the firm as chief engineer.

**Marvel-Schebler Products Div., Borg-Warner**—S. S. Meadows heads the new transmission department as vice-president and manager. Glen Bamberger was named works manager of the carburetor and aircraft departments, and Edward Walsh is assistant chief industrial engineer of the departments.

**Mechanical Handling Systems, Inc.**—Nelson C. Walker joined the company recently as director of manufacturing for all plants.

**Consolidated Vultee Aircraft Corp.**—B. P. Gibbons has been appointed to the new position of manager of material, and P. G. Osborn is now factory manager of Plant 1 of the San Diego Div.

**Northrop Aircraft, Inc.**—Gid A. Kelley is now manager of the cost estimating department.

**Axelson Mfg. Co.**—Bruce C. Elliott heads the newly-formed market research department.

**Reo Motor Co. of Canada**—Thomas J. Locke has joined the company as factory manager.

**Willys Motors, Inc.**—L. M. Gary is appointed director of forge sales, defense division.

**Raybestos-Manhattan, Inc.**—Joseph N. Kuzmick is now coordinator, corporation research and development.

**Douglas Aircraft Co.**—J. B. Edwards, formerly chief engineer for Hiller Helicopters, has returned to the engineering staff. K. G. Farrar has been promoted to general manager of the Long Beach Div.

**Hughes Aircraft Co.**—Lt. Gen. Harold L. George has resigned as vice-president and general manager.

**Menasco Mfg. Co.**—B. R. Fondren and Carl H. Kalbfleisch have been elected vice-presidents.

**Pastushin Aviation Corp.**—Frank McGraw has been appointed personnel director.

**Carter Carburetor Corp.**—Dudley A. Bragdon is now manager of after-market sales and service, following the resignation of J. L. McDonough.

**Continental Aviation & Engineering Corp.**—D. H. Silvern has joined the firm as senior engineer in charge of the gas turbine analysis group.

**Bendix Aviation Corp.**—J. H. Overholser has been named assistant to the general manager of the Pacific Div.

**Torrington Co.**—W. C. Thompson was promoted to executive vice-president, succeeding A. W. Burg, who is retiring. R. B. Nichols was brought from the Indiana subsidiary to succeed Thompson as vice-president in charge of sales.

**Fruehauf Trailer Co.**—Election of Luther E. Lawrence as assistant treasurer has been announced.

(Turn to page 158, please)

## Necrology

**Harry Merrick Reed**, 53, secretary and board member of Vanadium-Alloys Steel Co. and Anchor Drawn Steel Co., died at Latrobe, Pa., on Sept. 5.

**Fred W. Sommer**, vice-president and treasurer of Mack Trucks, Inc., died Sept. 5 after a short illness.

**Will Dammann**, 73, pioneer in the field of automobile wheel alignment and president of Bear Mfg. Co., died Sept. 11 at Rock Island, Ill.

**James Simpson**, 54, vice-president and general manager of the Long Beach Div. of Douglas Aircraft Co., died at the plant on Sept. 16.

**Herbert A. Gotteschalk**, 56, sales management executive of Kearney & Trecker Corp., died Sept. 26 after a short illness.

**Wendell J. Dernberger**, 49, material handling supervisor of the Ford Motor Co., died Sept. 26.

*We specialize in solving  
problems of*

# MOTION

*top* **10**

**SOURCES**  
for Mechanical  
Springs

Contact any Division for Action

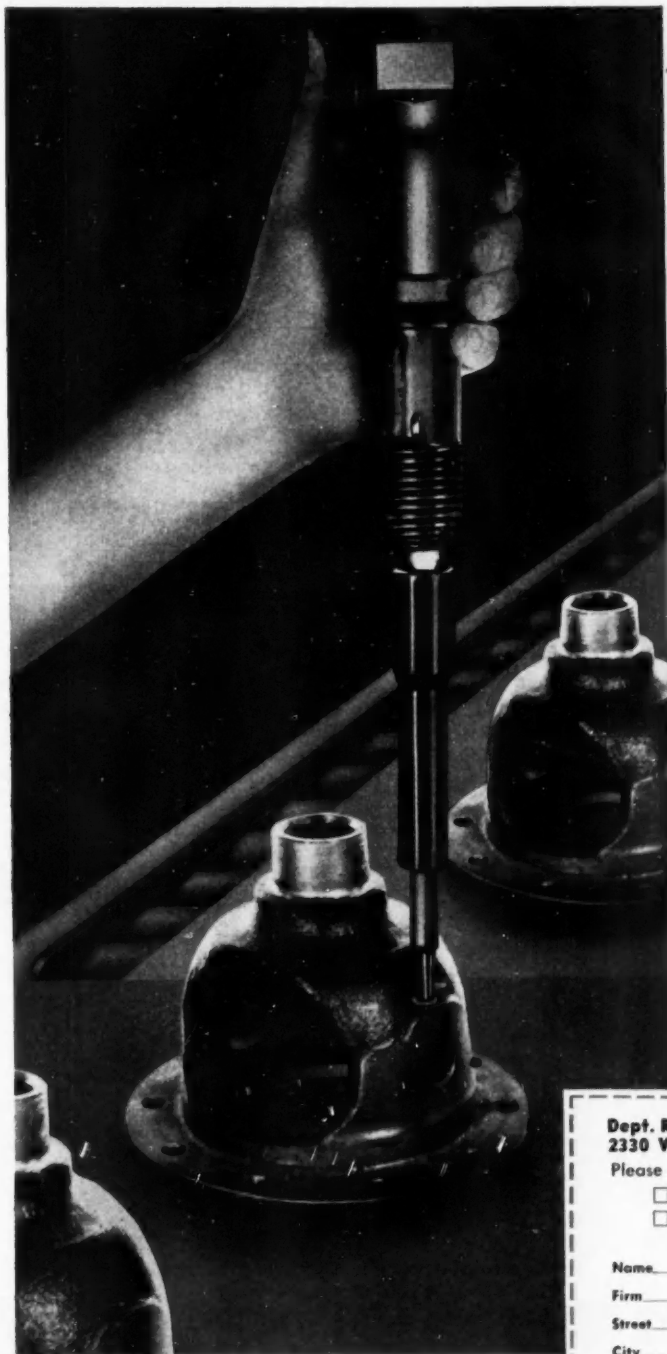
<b>WALLACE BARNES COMPANY</b> BRIDGE CONNECTICUT	<b>WILLIAM GIBSON COMPANY</b> 1000 CHESAIRE CHICAGO	<b>RAYMOND Manufacturing COMPANY</b> CORP. DENVER, COLORADO	<b>BARNES- GIBSON- RAYMOND</b> 2000 PLYMOUTH RD. MOUNTAIN VIEW, ILL.	<b>B-G-R COOK PLANT</b> 2000 ARBOR MICHIGAN
<b>W. H. HARRISS AND SONS CO.</b> 1000 CHESAIRE CHICAGO	<b>CHRYSLER DIVISION</b> 1000 CHESAIRE CHICAGO	<b>DUNBAR BROTHERS COMPANY</b> 2000 PLYMOUTH RD. MOUNTAIN VIEW, ILL.	<b>MILWAUKEE DIVISION</b> 2000 PLYMOUTH RD. MOUNTAIN VIEW, ILL.	<b>SEABOARD</b> Coil Spring Div. 400 CHESAIRE LOS ANGELES, CALIF.

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# Ford Cuts Assembly Costs using



*\*Rollpins applied as differential pinion pin lockpin on the Ford Motor Mound Road Plant assembly line.*

**Rollpin** is the slotted tubular steel spring pin with chamfered ends. Simply drive it into holes drilled to normal production tolerances. It compresses as driven—and its spring action locks it in place regardless of impact loading, stress reversals or vibration.

**Rollpin assembly eliminates extra operations and parts.** There is no precision drilling, threading, peening—and no cotter pins or other locking devices. Cost savings as great as 90% result—depending upon the type of fastener replaced and the assembly method now in use. Our illustration is an air gun set-up that installs Rollpin at the rate of 8 units a minute on the Ford assembly line.\*

Other insertion procedures range from simply driving Rollpin with a hammer to more intricate hopper-fed methods. Independent time studies have shown installed costs of Rollpin at 9% of that for a dowel pin and *less than 5%* of the installed cost of a taper pin.

Mail our coupon for information on how Rollpin will do your fastening faster and cheaper.

## ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R23-105, Elastic Stop Nut Corporation of America  
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

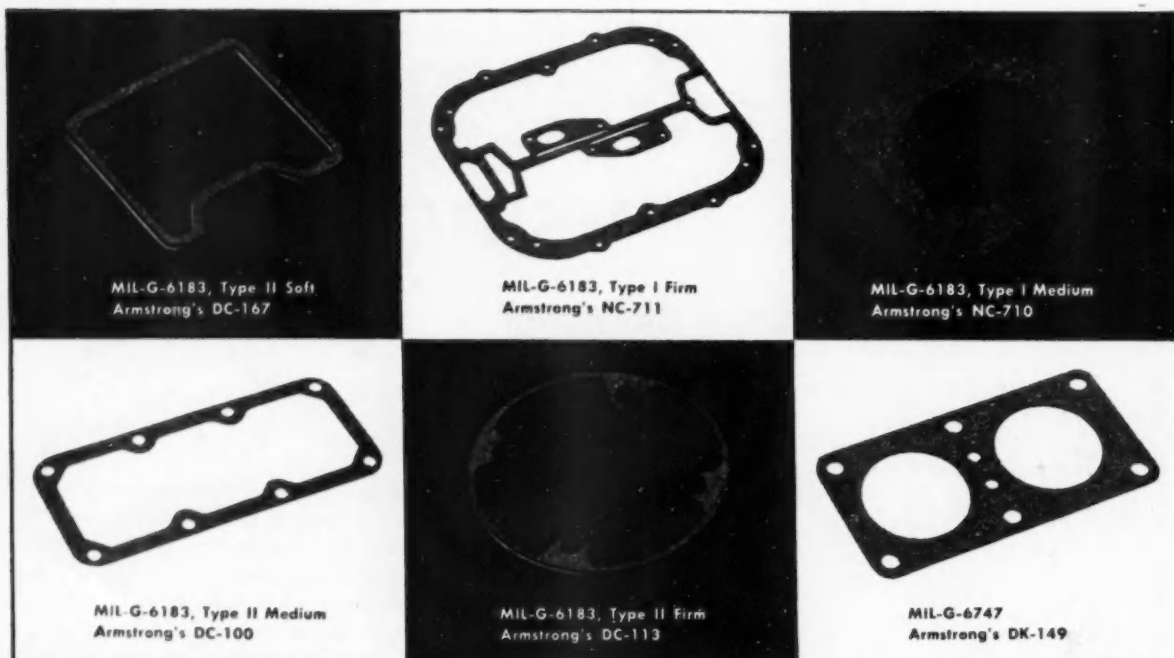
- ☐ Rollpin bulletin      ☐ ELASTIC STOP® nut bulletin  
☐ Here is a drawing of our product.  
What ESNA® fastener would you suggest?

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



## These nine different materials meet most government specs for cork-and-rubber gaskets



When you need a cork-and-rubber gasket to meet government specifications, check with Armstrong. Each of the Armstrong materials shown above is made to meet one of the nine principal specifications for cork-and-rubber gaskets. Sheets and tapes are available immediately from stock, parts cut to your order take only a little longer.

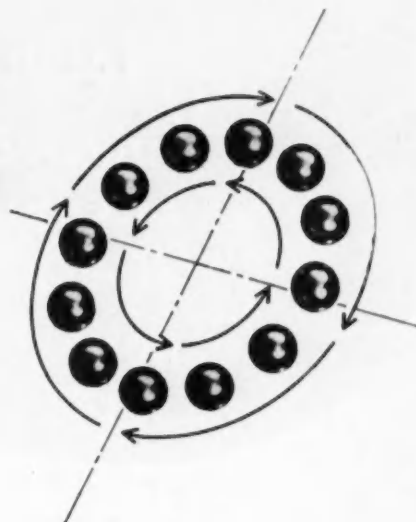
For samples and full information, call your nearest Armstrong Industrial Division Office or see the "Armstrong's Gasket Materials" section of Sweet's product design file.

**Free gasket data book.** Send for a free copy of the new 1953-54 edition of "Armstrong's Gasket Materials" for your file. It's packed with useful information: contains current government specs, tentative SAE-ASTM specs, plus sections on cost reduction, gasket tolerances, flange design, etc.

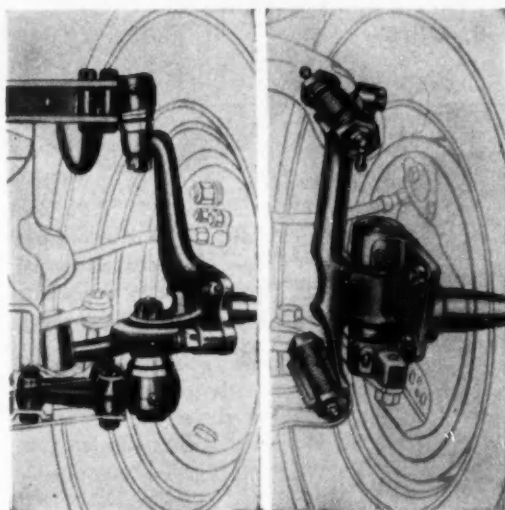
For your free copy, write to Armstrong Cork Company, Industrial Division, 7110 Imperial Ave., Lancaster, Pennsylvania.



# Armstrong's Gasket Materials



## Thompson Front Suspension Ball Joints .....mean ball-bearing Steering Ease



Thompson Front Suspension  
Ball Joint

Standard King Pin  
Type Suspension

This Thompson "Engineered Steering" development is a good example of Thompson cooperation with the automotive industry. We are at your service too. Write, phone or wire Thompson Products, Inc., Detroit Division, 7881 Conant Ave., Detroit 11, Michigan.

**PLUS** clear-cut solutions to *Six Other Major Problems* in manufacture and service.

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- Cutting front end overhaul time by *hours*
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- Increasing service life *many times over*

You can count on  
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MICHIGAN PLANT  
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## COST REDUCTION

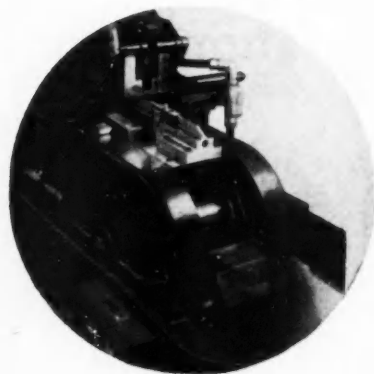
thru  
*faster*  
continuous  
broaching  
of multiple  
parts



• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

**THE FOOTE-BURT COMPANY • Cleveland 8, Ohio**

Detroit Office: General Motors Building



• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.



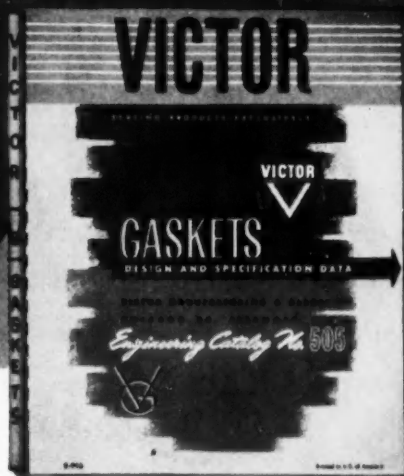
# FOOTBURT

## M A C H I N E T O O L S



# New Complete Guide to Gasket Materials meeting SAE-ASTM Specifications

For the Design Engineer \*



## Covers the 3 Vital Phases of Gasket Design and Availability

Section A — Engine Gasket Design

Section B — Victor Packings

Section C — Miscellaneous Gaskets

You will realize in this Catalog, a heretofore missing valuable service to design engineers. It equips you with current, complete, and precise technical information enabling a sound approach and solution to sealing problems requiring gasket materials. It tells what is available in the various standard materials. It is organized and edited for your convenient use, especially on new design work.

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This catalog is your key to Victor's storehouse of more than 40 years' experience in gasket development and manufacturing. It puts before you the most complete line in all current designs, and shows the way to most satisfactory fulfillment of your gasket specifications.

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- ☐ Complete edition  
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Title.....  
Firm Name.....  
Street.....  
City..... Zone..... State.....

## AMERICA TODAY

For what America is today, much credit must be given to the unfailing enterprise of the automobile industry—it has fathered the oil industry and the rubber industry; it has provided our largest single market for steel, and it has built the great network of roads and highways that we have today. In short, it has created millions of jobs in almost every conceivable branch of our economic life, and has added billions of dollars to our national income.—Benjamin F. Fairless, Chairman of the Board, United States Steel Corp.

**T**HE role of the automotive industries in encouraging development of new materials, new processes, advanced machine tools, and even the establishment of supporting industries is emphasized by the many new things to be featured at the National Metal Show of 1953.

Perhaps it is a novel appraisal of the importance of the automotive industries to consider their influence upon advanced methods, machinery, and materials. This influence can be better appreciated when it is considered that in 1953 the wholesale value of the production of these industries accounted for the staggering total of \$26,639,200,000, according to estimates made recently by the Chilton Research Department.

### Most Efficient Equipment

The enormous volume of production, representing the manufacture of individual parts by the millions, makes it not only economical but an actual necessity to buy the most advanced type of manufacturing

## MANY INDUSTRIES

*Given Impetus*

## By Automotive

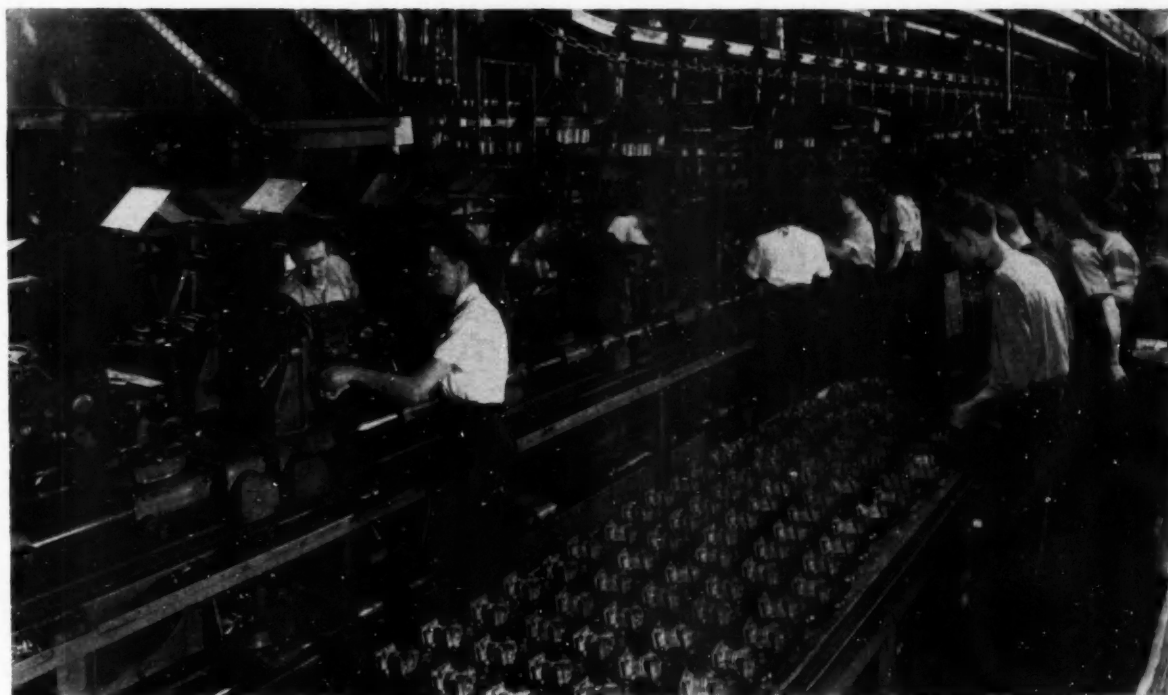
equipment. For it is a problem not only of cost economy but the ability to turn out exceedingly larger quantities of all kinds of things for automotive products quickly and with a minimum of floor space and

manpower. It is a race against time itself.

Out of this urgency has evolved first the transfer machine of today, capable of handling automatically scores or more operations in a fast and continuous cycle; then the push-button plant; then automation; and more recently the marvelous almost completely automatic manufacturing plant as exemplified by the Ford-Cleveland engine plant.

### Huge Market

What does it take to engender these developments? Imagination and the will to do, of course. But these ingredients alone will not pay for invention, research and development, and exploitation. What is needed basically is a market big enough to justify the costs involved; a market capable of absorbing the product stemming from this effort. Of all the metalworking industries in this country the automotive industries alone have the initiative and volume to encourage the basic developments and to support their exploitation.



# Production Advances

By Joseph Schelin

Naturally, once development and manufacture of advanced machinery has been underwritten, the way is clear for the individual producers to seek other applications. Not only does this expand business and aid in diversification; it also makes available to smaller industries the full advantages of mass production at a reasonable investment.

It is not necessary to review the developments in this field for readers of *AUTOMOTIVE INDUSTRIES* since practically every issue carries details of new plants and new mechanization. What is noteworthy is that the accelerated programs initiated immediately after the end of WW II are spreading widely throughout the automotive industries and will predominate from now on.

## Automation

Automation and complete automaticity have brought about some new problems. All industry has turned to statistical quality control in one form or another to gain proper control of quality and to assure complete interchangeability of parts made by the hundreds of thousands and by the millions. In the past 15 years or less this has led to the development and introduction of new kinds of instruments and checking devices, many based upon the science of electronics. The gamut

of such devices has given rise to new industries and new companies as well as expansion of existing old line producers. The phenomenal rise of instrumentation and automatic sorting and checking devices may be logically considered as a by-product of the requirements of modernized automotive industries.

We mentioned automation. After all, automation is an advanced development in the field of materials handling—with many plus features, of course. But essentially it is an outgrowth of what has been termed mechanization, an intensive use of materials handling devices of every known kind, designed not only to reduce costs but to eliminate manual handling as well. This field abounds in power driven conveyors of every description, cranes, hoists, gravity roller conveyors, elevators, automatic weighing devices, and industrial trucks of every kind.

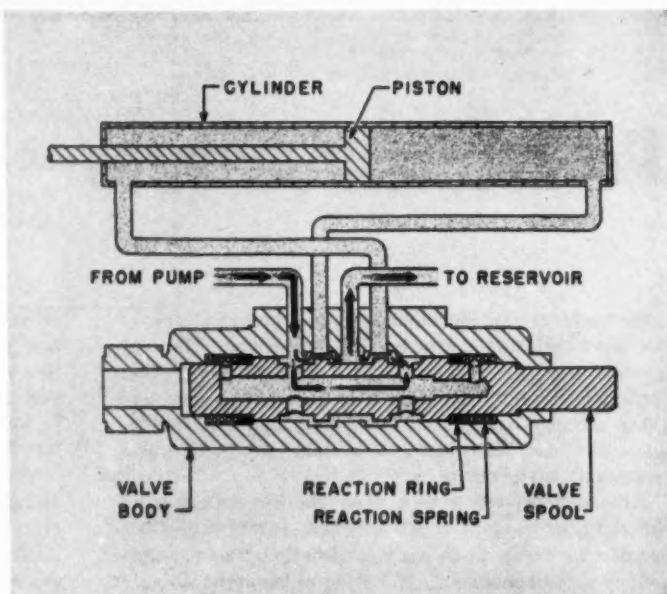
Mechanization, a must in the automotive industries, has given new vitality to the manufacturers in the industrial truck field. Palletizing and related methods of handling and storing have acted to increase the development and use of the versatile fork and lift trucks, creating virtually a new, big industry. The fact is that its encouragement stems from the vitality and buying power of the automotive industries.

*(Turn to page 122, please)*



Royal four-door sedan.

## Dodge Adds Royal V-8 Model



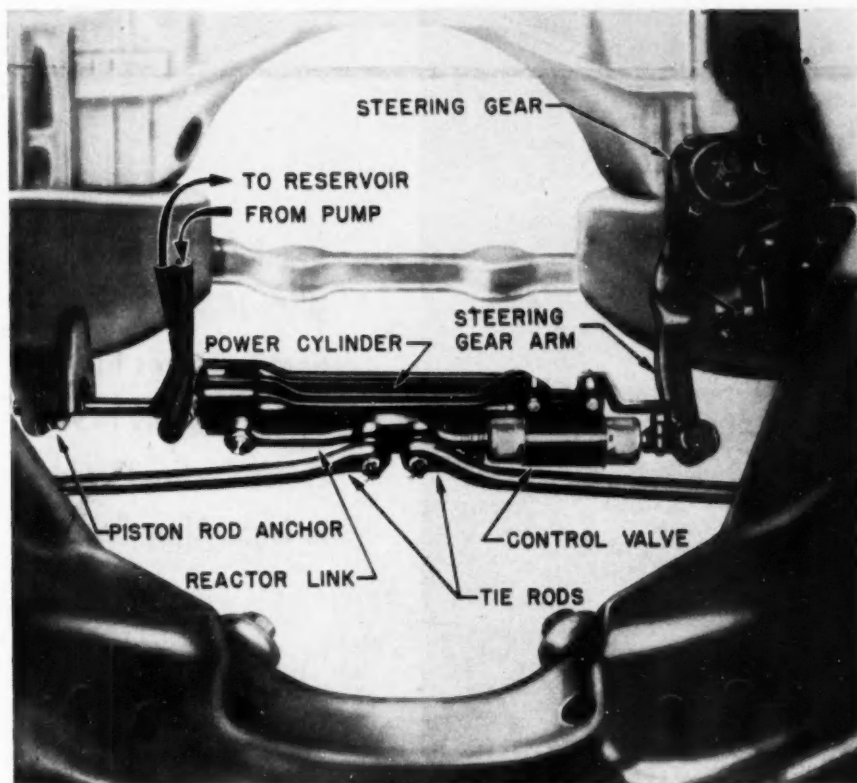
Schematic flow diagram of power steering used on V-8 cars. Control valve is centered in this view.

**H**IGHLIGHT of the 1954 Dodge passenger car line is a new super deluxe series known as the Royal V-8. While the Royal V-8 features super deluxe appointments and fittings, the entire Dodge line, consisting of 20 different models, is marked by many new styling changes. In addition, the 1954 line offers such mechanical advancements as a new fully-automatic transmission, a new power steering

unit, and a stepping up of the V-8 engine horsepower to 150 with 7.5 to 1 compression ratio. Meadowbrook V-8 models will continue at 140 hp. The horsepower of the six-cylinder engines has been raised to 110 and the compression ratio to 7.25 to 1.

Overall length of the four-door and club coupe models has been increased by four in. and the sport coupe and convertible have been lengthened by five in.





Arrangement of linkage-type power steering used on V-8 cars.

On the body exterior, a new, spear-like chrome molding accents the low, sweeping appearance of the entire line.

Other major body changes include the grille design and front end. The new grille is lower, wider and has a more massive appearance. The ram hood ornament has been streamlined, and a distinct, new styling has been given to the V-8 crest and chrome-lined air scoop. Headlamps have been redesigned and the bumper guards have been modified.

Jacquard fabric is used for the interior upholstery. This cloth was chosen for its raised nap, adaptable to elaborate double patterns, and its close weave, which is wear resistant. Three basic color tones—green, blue and red—are featured in the patterns designed for use on the new line.

The 1954 Dodge line has a choice of two transmissions. In addition to the new, fully automatic PowerFlite drive; the standard three-speed transmission, either with or without automatic overdrive also is available.

PowerFlite, which requires no clutch pedal, combines a torque converter and a two-speed planetary gearbox in a smooth-flowing driving operation. Operation of PowerFlite is simplified for the driver by the slotted design of the selector lever. Neutral and drive positions are on one level of the selector lever. Reverse and low gears, on a higher level, are selected by a

slight lifting of the lever and sliding left or right. This makes it possible to select a driving range by "feel," without looking at the pointer. Also, because reverse is adjacent to neutral, it eliminates shifting through a forward gear when backing up. See description of the PowerFlite transmission in *AUTOMOTIVE INDUSTRIES*, August 1, starting on page 48.

The new Dodge full-time power steering unit has direct control and is of the linkage type. It eliminates about 80 per cent of steering strain for the driver and, in the event of power failure, full mechanical control of steering is maintained.

Of the 20 models being introduced, four

are Royal V-8's. They are the four-door, club coupe, sport coupe (hardtop) and convertible. In the two Coronet series there is a four-door and club coupe in a choice of V-8 or Six, plus a sport coupe and convertible in V-8 only. The two Coronet series also offer a combination of six different station wagon models. A four-door and a club coupe make up the Meadowbrook series in a choice of either V-8 or six-cylinder power.

Station wagons may be obtained as the Sierra four-door in either a six-passenger model with two full seats, or as an eight-passenger version with three seats, and with a choice of either the V-8 or six-cylinder engine. The other two station wagon models are the Suburban two-door with a choice of engines.

## PowerFlite Production Peaks

Production of the PowerFlite automatic torque converter transmission has reached 700 per day at the Indianapolis plant. Deliveries began last summer on the Chrysler line, and the maker estimates over 10 million miles have been accumulated by owners so far. With the option of PowerFlite on three of the four Chrysler lines for next year, production of the M-6 transmission is sure to be abandoned soon.



*Panhard Dyna 54 six-passenger sedan (above) and complete six-passenger, light alloy body (below), which weighs 216 lb.*

**Six-Passenger Car  
With 101-In. Wheel-  
base Features Curb  
Weight of Only 1430  
Lb. No Castings Used  
in Light Alloy Body.**

## New Panhard Light Alloy Sedan

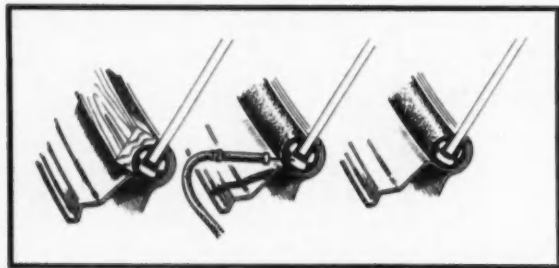
**B**REAKING away from conventional design and employing light alloy on an elaborate scale, Panhard & Levassor has brought the curb weight of its new six-passenger Dyna 54 sedan to the low figure of 1430 lb. This weight includes tools, one

spare wheel and full tank and is believed to be the lowest weight per passenger of any automobile in regular production.

By European standards the Dyna 54 is a big automobile. It has a wheelbase of 101 in., width of front and rear seats is 53 in., internal height from floor to roof 47 in., ground clearance eight in., total height 56 in., and length from instrument board to back rest of rear seat 69 in.

This car is the culmination of a series of Panhard light alloy models. Whereas the earlier models, produced immediately after the war, embodied many big light-alloy castings, notably the front bulkhead and windshield frame, to which the power plant was attached, the latest model is entirely sheet metal construction. Castings are confined to the engine parts—crankcase, oil pan, covers, etc.

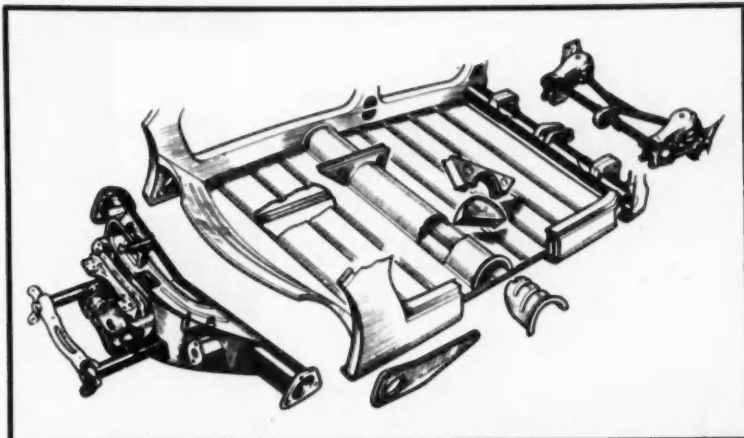
The metal used is Duralinox, supplied by Aluminum Francais, and is employed in three principal thicknesses of 1.2, 1.5 and 2.5 mm. Because of the amount of sheet metal work involved, arrangements have been



*The windshield glass is set into rubber channel which has air cells inflated by a hypodermic needle.*

**By W. F. Bradley**

Special European Correspondent  
for AUTOMOTIVE INDUSTRIES



Three basic platform elements of the car.

made for the bodies to be produced by the Chausson Co., of Paris. Panhard will build all the mechanical parts, and will carry out all the assembly, trimming, painting, etc.

The Dyna 54 is divided into three sections: the one-piece frame and body, entirely of light alloy, and weighing complete without glass or trimming 216 lb; the front unit consisting of a platform carrying the engine clutch, transmission, drive to the front wheels, steering gear, springing and shock absorbers; and the rear unit comprising a special axle, suspension, brakes and wheels. The front-end has independent suspension; rear suspension is semi-independent.

The engine, which has been in production for several years, is an aircooled flat twin of 50.6 cu in.

piston displacement, developing 40 hp at 4000 rpm.

An entirely new feature is the adoption of a welded sheet steel platform on which the power plant, front suspension, etc., are mounted. This platform has a tube of 5.5 in. diameter, with flanged ends, for three-bolt attachment on each side to the base of the body. Welded to the front of the tube is a box-section platform carrying the steering gear and the two leaf springs, and the battery. Projecting forward from the platform are two parallel steel tubes of two in. diameter, united by a cross member to receive the engine mountings. This steel platform construction weighs 83.6 lb.

The front bumper is incorporated with the power plant unit. Two steel tubes telescope into the engine-mounting tubes and are held by two lugs and a couple of bolts. The tubes are splayed outwards and have a big diameter tubular bumper bar welded to them. This bumper bar has a channel-section polished aluminum facing. On its center it carries a vertical strut for the hood lock and on its two ends there is a cone to receive rubber sockets on the rear-hinged hood.

A feature of this layout is that it provides for carrying out minor or major repairs without interfering with the body, even with the doors locked. There are no front fenders, the hood being a single unit enveloping the wheels. When it is raised the engine, front suspension, etc., are readily accessible.

In the body design one objective has been a basic platform offering the highest degree of rigidity. As shown in the illustration, this has two side rails with a height of 6.5 in., three cross members, and a flat floor with transverse corruga-

(Turn to page 96, please)



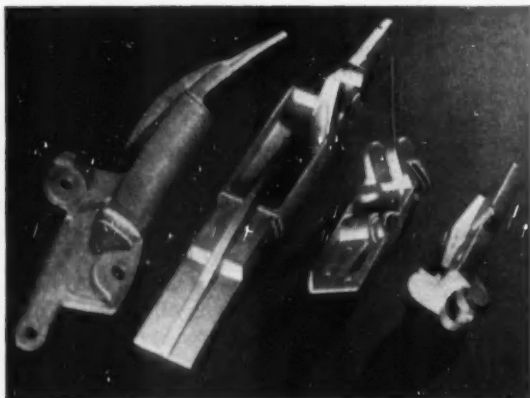
Complete power unit. Attachment to the integral body and frame is by bolts through flanges at the ends of the large tubular cross member.

## Increasing Use of

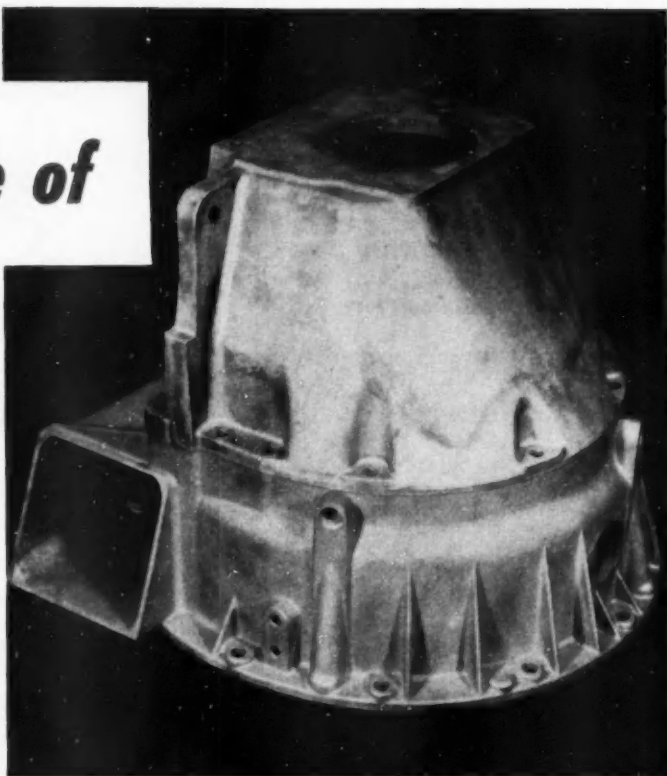
**W**ITH the recent widespread use of such automotive advancements as power steering and power brakes, there has been a greater impetus given to the market for die castings. This appears to be a fast growing field similar to that opened some 12 years ago by the automatic transmissions, since the aforementioned developments have gained very rapid consumer acceptance.

Power steering, power brakes, and automatic transmissions are just three of the many assemblies where die cast components are utilized. In a typical car equipped with an automatic transmission there are some 83.5 lb of aluminum, magnesium, and zinc die castings. Aluminum accounts for 38.5 lb, magnesium for two lb, and zinc for 43 lb. Total weight of aluminum die castings in the average automatic transmission alone is 21 lb.

**ALUMINUM**—In the competitive scramble of engineered parts for automotive markets aluminum die castings have shown some of the most rapid advances in usage. Because they combine low cost on production runs with light weight, dimensional stability, and good heat dissipation, aluminum die castings are



Convertible top hardware fabricated by magnesium die casting.



Torque converter housing die cast in magnesium.

being used increasingly for many automatic transmission parts, clutch housings, carburetor parts, oil pump bodies, and water pump parts. In addition, there is much research in the quest of potential uses for the light metal.

It is felt that the definite future for aluminum die castings in the automotive field lies to a large extent with automatic transmission parts, and engine accessory parts. There is, in addition, a potential market in automotive hardware applications, power steering and power brake parts, and engine components.

An example of how far aluminum die castings have advanced in automotive applications can be determined from the 30 parts that go into a 1953 high-priced passenger car. These include: engine parts—fan spacer, fuel pump components, oil filter components, carburetor throttle body; brakes—power brake unit; power steering—valve body piston parts, valve body cap; automatic transmission—governor body, two valve bodies, clutch piston, output shaft support, transfer plate and cover, servo piston, kickdown piston, oil pump housing, torque converter housing, selector lever and collar.

Aluminum die castings in a typical low-priced car equipped with an automatic transmission include: engine—fan spacer, fuel pump parts, front end engine oil seal plate; brakes—master cylinder filler plug; automatic transmission—clutch housing, torque converter housing, selector lever brackets.

The growth of aluminum die castings in relation to the market for die castings in general has been



# ***DIE CASTINGS***

## ***for Automotive Components***

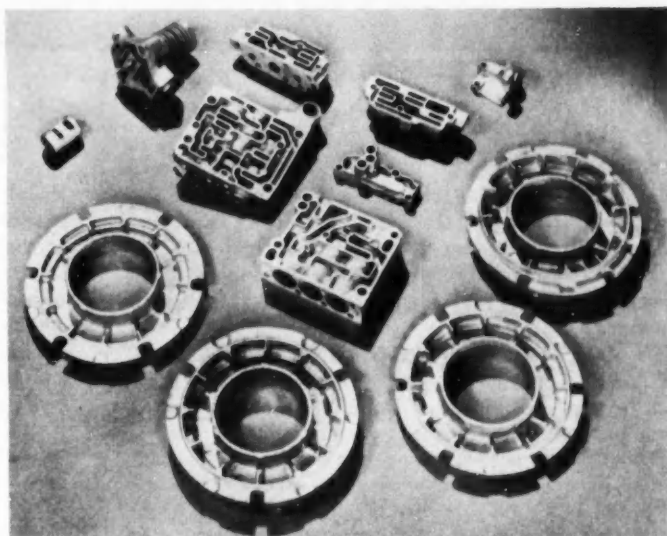
**By**  
**Thomas**  
**Mac New**

extremely rapid. Zinc has long been the predominant metal in the die castings field. In the past few years, however, aluminum has caught up with, and threatens to pass zinc as the metal most often die cast.

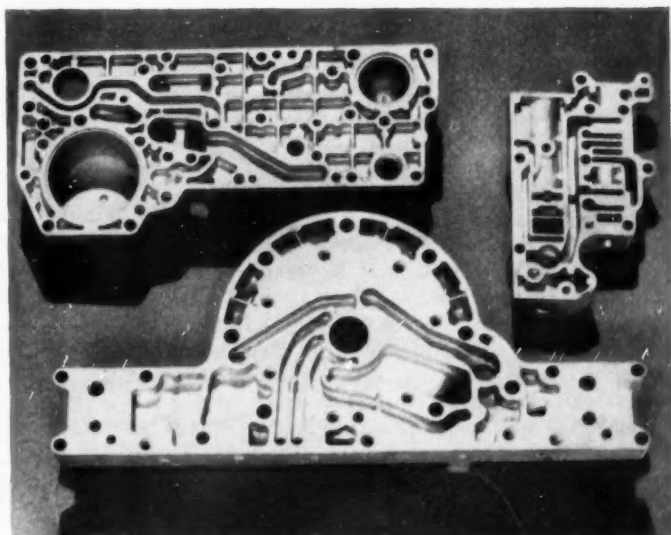
In 1946, there were 36,851 short tons of aluminum die castings shipped in comparison with 187,957 short tons of zinc die castings. Since aluminum weighs much less than zinc, aluminum die castings in tons should be multiplied by 2.4 to compare geometric volume. By 1952, the weight of aluminum die castings shipped increased to 84,500 tons, while 202,750 tons of zinc die castings were shipped. During the first six months of this year, 64,041 short tons of aluminum die castings were shipped as compared with 142,556 short tons in zinc. Using the volume ratio of 2.4 to 1 of aluminum to zinc, this puts aluminum ahead in volume production. These figures apply to all die casting production.

As the market for die castings catapults upward, prognostications of experts in the field tend to be less fantastic when they speculate on new applications. Aluminum die castings were shipped in the first half of 1953 at a rate almost 70 per cent above the same period a year earlier. The future, according to the makers, is equally as promising.

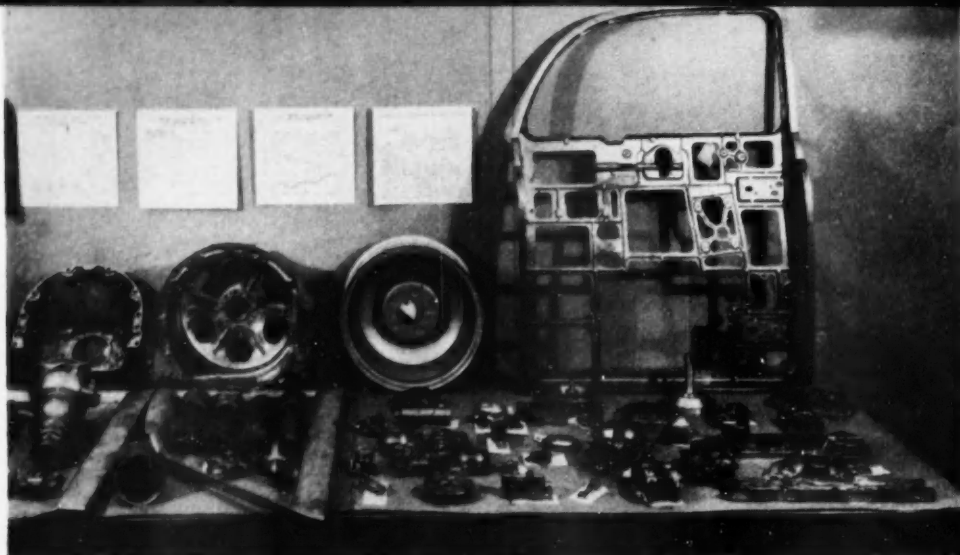
The increasing interest in small cars is expected to bring out lower horse-



**The various aluminum parts illustrated here are die cast by Doehler-Jarvis for GM's Hydra-Matic transmission. They include valve castings and annular clutch piston castings.**



**The valve, servo and converter castings used in the Buick Dynaflo show the detail attainable with die cast parts.**



Miscellaneous aluminum, zinc, and magnesium die cast parts that have been designed for automotive use. One of the most interesting parts is the large die cast door frame.

power engines after the present quest for higher horsepower. One of the more interesting European developments in lower power engines has been the aircooled German engine of the Porsche type which is made principally from aluminum and magnesium castings.

If high horsepower remains the vogue—and even if it doesn't—braking systems for automotive vehicles can be improved. Die cast aluminum brake drums are said to have the advantage of aluminum's rapid heat dissipation to reduce lining wear and improve efficiency. Proper design should offer adequate strength with low cost.

According to Alcoa, the principal key to an even more promising future for aluminum die castings probably lies in research on improving die life. Being cast at a higher temperature than zinc, aluminum, like magnesium, is harder on die steels. The die steels are also subject to heat checking which causes minute ridges in the finished castings.

Improved die steels now being developed will allow lower costs as well as offering consistent surfaces for inexpensive chrome plating and finishing. This will bring aluminum die castings into more active competition for automotive hardware applications and other decorative uses.

Die steel research is being actively promoted by the Die Casting Research Foundation, Inc. This group has awarded a contract to Battelle Memorial Institute to carry on the program.

Alcoa has been very active in research in the development of new aluminum alloys to allow lower cost production, longer die life, better finish and greater strength.

Among the advantages of aluminum die castings are the many finishes that are possible. While the as-cast finish often is acceptable in its bright state, for certain applications it is desirable to apply some type of surface finish for additional protection or to obtain some decorative effect.

Aluminum alloy die castings respond to a wide vari-

ety of finishing treatments. Among the more important are burnishing, buffing, painting, electroplating, anodizing, etching and chemical treatments of the surface conversion type.

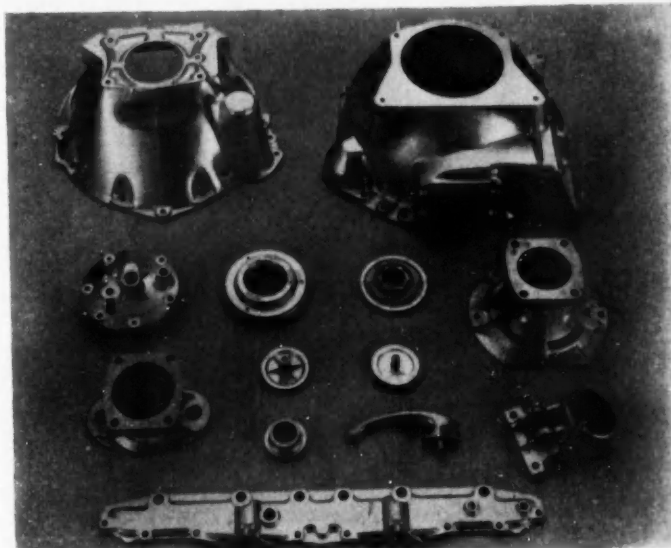
Surface finish is especially important when aluminum alloy die castings are considered for decorative automotive hardware. For these applications, aluminum can be electroplated with a chrome finish or given an anodic treatment.

Prospective improvements in as-cast surface of aluminum die castings should put the light metal in an



A die with the impression of a torque converter casting is shown coming out of the heat treating furnace.

Aluminum die castings representing a variety of parts supplied to the automotive industries by Alcoa's Chicago Works. On the top row, left to right, are a clutch housing and a torque converter housing. The second row includes a transmission gear shift housing, a clutch piston, a piston front clutch, and a large torque tube adapter. The six parts in the third row, starting at left, with a small torque tube adapter, a reverse servo piston and a rear servo piston (above) and a servo sleeve and door handle below. A rear servo body completes the third row. At the bottom is a manifold cover.



excellent competitive position for automotive hardware. Chrome-plated parts will be less expensive; and finishes such as Alumilite may be made practical for a wide variety of colors.

The principal factor in the growth of die castings naturally has been increased recognition by design engineers. They are coming to recognize that aluminum die castings are strong and dependable when all design factors are given proper consideration.

Correct design will allow a die casting to substitute for an aluminum forging in some instances. A few simple rules need to be followed to assure serviceable and reliable parts, particularly in engineering applications. These include:

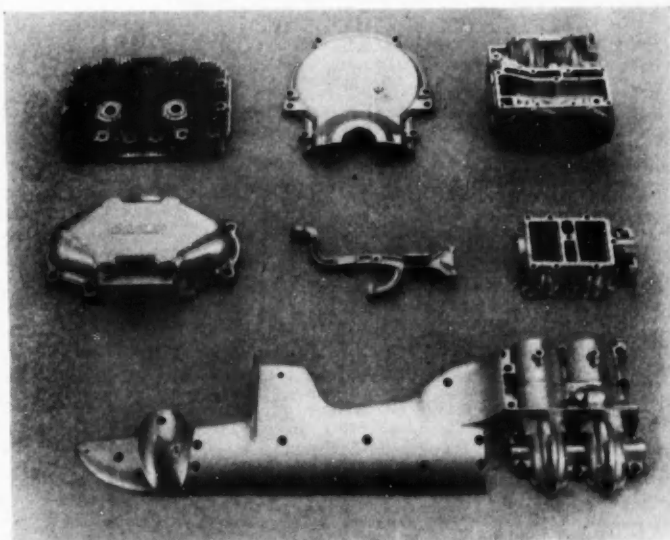
1. Thin, highly stressed ribs should be avoided as well as sharp corners.
2. A gradual change from thick to thin sections should be used to reduce stress concentration.
3. Holes to be tapped should be cored.
4. Finish allowance should be kept low as possible to keep porosity, uncovered in machining, at a minimum.
5. Test bar values should be carefully interpreted since they often vary noticeably from finished parts in strength.

In designing with aluminum die castings it should be remembered that they have excellent fatigue properties that are superior to aluminum sand castings and equal to aluminum forgings. In spite of some internal unsoundness, the resistance of the surface of an aluminum die casting to fatigue stresses makes their future look very promising.

**MAGNESIUM**—Die castings of magnesium are usually utilized where lightness is one of the main requirements. In the automotive industries, however, one of the primary reasons for the use of magnesium die castings for cars has been to cut down on cost. Die castings



Magnesium supplied by Dow goes into die castings of brake shoes, spiders, and wheel hubs made by the Shuler Axle Co.



These aluminum parts, which illustrate the versatility of die castings, include in the top row, left to right, a cylinder head for a two cyl engine, a timing case cover, and an outboard motor cylinder block. In the second row there is a tank engine rocker box cover, a support bracket, and an outboard motor crankcase. At the bottom is a large outboard motor die casting which includes half of the cylinder block as an integral assembly.

have proved to be one of the most advantageous forms, not only from an initial cost standpoint, but also  
(Turn to page 98, please)

# RUSSIA'S

TABLE I  
SOVIET PRODUCTION  
1950 to July, 1953

(Based on reports from the State planning Commission, U.S.S.R.)

Item	Unit	Soviet Union					United States
		1950	1951	1952	1953 (July)	1955 (Plan)	1951
INDEX OF MINERAL CONSUMPTION	U. S. 1935-39 aver. = 100	43	48	53.5	55.5	(71)	196
ELECTRICITY	billion kwh	90	103	116	125	162	433
DOMESTIC TRANSPORT	billion mt x km	657	738	816	—	961	—
MANUFACTURING:							
Coal	million mt	(220)	283	303	310	378	519
Lignite	million mt	(42)	—	—	—	—	0
Petroleum	million mt	35.0	39.2	43.9	46.1	64.7	324
Natural gas	million cu m	2.6	2.8	2.8	3.0	4.9	(170)
Pig iron and ferro-alloys	million mt	19.3	22.0	25.1	26.4	34.0	65.0
Aluminum, primary	thous. mt	180	—	—	—	468	792
Copper, primary <sup>a</sup>	thous. mt.	290	330	379	386	550	1,131
Lead, primary <sup>a</sup>	thous. mt	144	180	210	233	390	448
Zinc, primary <sup>a</sup>	thous. mt	126	147	182	187	320	611
Cement	million mt	10.6	12.6	14.5	15.6	23.3	61.0
Cars & trucks	thous. units	400	—	—	—	500	6,800
Machine tools	thous. units	82	84	86	98	213	—
Paper	million mt	1.23	1.38	1.50	1.62	1.80	14.9
Cotton cloth	million m	3.96	4.05	5.14	5.30	6.40	9.3
Shoes, leather	million pr	(200)	(235)	—	—	(310)	467
Sugar, refined	million mt	2.15	2.54	2.62	— <sup>b</sup>	3.8	7.0
TIMBER CUT, ROUND WOOD	million cu m	155	181	—	—	242	(280)
AGRICULTURE							
All grains	million mt	(95)	(92)	(99)	—	(138)	149
Wheat	million mt	(30)	—	—	—	(48)	27
Potatoes	million mt	(75)	—	—	—	(106)	(12)
Unplanned cotton	million mt	3.75	3.94	3.6	—	6.0	(16)
Cattle	million head	57.2	58.8	56.6	—	68.1	84.2
Hogs	million head	24.1	26.7	28.5	—	35.5	65.0
Sheep & goats	million head	99	107	109.9	—	159	26.0
Horses	million head	13.7	(14.5)	15.3	—	15.2	6.7
FISH CATCH	thous. mt	1.72	2.10	—	— <sup>c</sup>	2.72	(2.2)

<sup>a</sup> Up to 20 per cent secondary output.

<sup>b</sup> The 1953 target is 3.6 million mt, or 67 per cent above 1950 (New York Times, August 9, 1953). The same source, however, states that 1952 beet-sugar output was 27.2 million mt or only 16 per cent above 1950. Achievement of the refined-sugar goal is therefore most unlikely.

<sup>c</sup> Under 1952.

A SURVEY of Soviet economic development since 1950 involves the consideration of four areas: production; investment; manpower; and armaments and consumption. It rests necessarily upon the interpretation of official Soviet statistics given with the usual ambiguities of definition and quantity. Thus, while the general trends described are probably accurate, great faith should not be placed in specific figures.

## Production

From January, 1951, to July, 1953, the Soviet index of gross industrial production (manufacturing, mining, lumbering, and commercial fishing) rose 35 per cent, exactly halfway to the Fifth Five-Year Plan goal. Over the same period, the rise in mineral production (and estimated consumption) was 29 per cent; that in electrical power output, 39 per cent. Both are slightly behind plan. On the other hand, domestic freight ton-mileage increased 24 per cent between 1950 and 1952, faster than anticipated. Therefore, it appears likely the overall growth of Soviet industry is proceeding at the planned rate, or only slightly less than plan. (Table I.)

An interpretation of this generalization is essential. In mining and refining, coal and lignite production is expanding close to plan. This is rather surprising, since the Donets Basin of the Ukraine, still the largest coal producer, and the Moscow Basin, the largest lignite producer, are suffering greatly from gas bursts and underground fires. In the Stalin Combine of the Donets Basin, for example, 64 per cent of the shafts with an output of 1000 mt per day or over were, in 1951, in the highest danger category, with gas flows in several running 100 cu m per metric ton of output—more than 10 times the permissible level in U. S. coal mining. In January, 1950, coal mining at Borovichi (58°25'N 34°0'E) was being maintained while underground fires were in progress. The costs of Soviet coal mining under such conditions may be presumed high. Petroleum and natural gas output is far

## PART II



# STRENGTH TODAY

By Demitri B. Shimkin

Consulting Editor of  
**AUTOMOTIVE INDUSTRIES**  
on Russian Industrial Affairs  
Russian Research Center, Harvard University

**P**ART I of this two-part article which compared the Soviet Five-Year Plans of 1946-1950 and 1951-55 was published in the October 1 issue of **AUTOMOTIVE INDUSTRIES**. Part II, which is presented here, is devoted to an analysis of the Soviet accomplishments from 1951 up to the present time. In it Dr. Shimkin shows how, despite some recent concessions to the consumer, no letup in an intense armament effort is in sight. He points, out, however, that the margin of power in the West still remains great.

behind plan. Because of these facts, the current insistence of the Soviet government upon the strictest economy of fuel is understandable.

In ferrous metallurgy, Soviet progress has been excellent. True, the two largest iron-ore mines in the country, Krivoi Rog in the Ukraine and Gora Magnitnaya in the Urals, are encountering the problems of severe depletion, and the former is admittedly producing well below expectations. But the Soviets have installed magnetic separation and sintering equipment, and begun operation at other, low-grade but large deposits: Kerch in the Crimea, Alapayevsk and Ayat in the Urals. They have modernized many blast furnaces with compressed air and automatic temperature-regulating installations; one, at Nizhnii Tagil in the Urals (57°55'N 59°57'E), is even provided with automatic charging. (*Izvestiya*, July 9, 1953.) In addition, they have put new capacity in operation: 1.3 million mt of pig iron and 2.75 million mt of steel (at Orsk, 51°12'N 58°35'E, in southern Urals) in 1951 alone.

Non-ferrous metallurgy is generally behind plan. Lead output has had the best record, with the development of the new Tekeli mine (40°30'N 69°25'E, in Central Asia) evidently being a major factor. Furthermore, the completion of at least one section of the Ust' Kamenogorsk hydro-electric plant (49°58'N 82°39'E, on the Irtysh) promises well for the expansion of lead-zinc mining in the nearby Ridder group of deposits, the largest in the U. S. S. R. Copper output, after good progress in 1951 and 1952, appears actually to have declined, and is far behind plan. Data on current aluminum and tin are lacking.

In non-metallic minerals other than fuels, the best progress is being realized in cement production, which has risen 47 per cent in two-and-a-half years, to 15.6 million mt. On the other hand, the shortages of sand, gravel and stone are markedly affecting construction, while timber output has not been reported since 1951.

For the chemical industry, only relative production figures are available. Claimed increases in soda ash, caustic soda, and synthetic rubber output are above or close to plan: 52 per cent, 29 per cent and 36 per cent rises from 1950 to mid-1953, compared to five-year goals of 84 per cent, 79 per cent, and 82 per cent, respectively. On the other hand, the output of mineral fertilizers is lagging badly, with a total 20 per cent increase compared to an 88 per cent goal. Whether this lag reflects delays in the expansion of basic chemicals production, or whether it has resulted from the increased diversion of sulfuric and nitric acid to explosives cannot be demonstrated from the information available.

The Soviet position in producers' goods manufacturing is obscure. The volume of machine-tool production is at present only 19 per cent above 1950, compared to the five-year goal of a 160 per cent rise. The output of steam turbines, the sole other continuous series, has risen 49 per cent over the past two-and-a-half years, compared to the 1951-1955 goal of a 130 per cent increase. Data on the production of motor-vehicles, tractors, locomotives, freight cars, and various lines of machine-building have been suppressed to such a degree that not even percentage gains since 1950 can be ascertained. Yet the Soviets claim a 40 per cent increase in machine-building output, 1950-1952; if true, this claim could only come from the expansion of armaments production. Important evidence confirming increased ordnance output has appeared: first, since 1951, heavy pressure toward substitution has reappeared in the machine-building industries. Molybdenum, nickel, cobalt, tungsten, tin, copper, primary aluminum, and sheet and plate steel have all been in short supply. Illustrative of current trends are the prohibition against molybdenum in tool steel except by special permit, and the substitutions of fused alumina for tungsten-cobalt carbides in tool bits, of zinc-bearing secondary aluminum for primary aluminum in motor-vehicle cylinder blocks. These shortages are clearly attributable to the pressure of jet-engine and other military programs.

In addition to pressure from military demands, a lesser though probably significant factor inhibiting the growth of civilian producers' goods manufacturing has been the

# RUSSIA'S STRENGTH TODAY

continued

difficulty of maintaining the new automatic production lines and other advanced equipment. For example, the automatic equipment at the large "Krasnaya Etna" plant in Leningrad was, according to Kurbatov, out of operation 23 per cent of the working time in 1950. Repairs took as long as five months and could often be effected only by cannibalizing other machine tools. The situation at the plant is now said to be much better, with down time at 9.3 per cent.

Finally, indications of some cutback in military production were evident in the July, 1953, Soviet statistical report which was marked by the reappearance of data on locomotive output and by claims of markedly increased machine-tool, steam turbine and electrical motor production. In all, it appears to me certain that the Soviet producer's goods industries have, in the last two-and-a-half

years, been dominated by direct military demands. A change in direction may be coming, but is far from certain.

Soviet agriculture is clearly far behind plan. In 1952, the production of unginned cotton was, according to direct official figures (New York Times, August 9, 1953), four per cent under the 1950 crop, compared to a 1950-55 planned increase of 55-65 per cent. The claimed grain crop in 1952 was three per cent higher than in 1950, against the 40-50 per cent increase targeted for 1950-55. The corresponding figures for sugar beets were 16 per cent and 56-70 per cent. For livestock, the figures recently released by Khrushchov (N. Y. Times, September 15, 1953) show that the situation remains poor. True, horse numbers are well ahead of plan, but hog, sheep, and goat numbers have increased only slightly since 1950, while cattle have actually declined. The fish catch too has admittedly lagged, falling between 1952 and 1953. The revision of the agricultural tax system in the U. S. S. R. announced in August, 1953, which is to provide somewhat better incentives to the collective farmers, is clearly a matter of dire necessity.

In view of the failure in agriculture, it is scarcely surprising that many consumers' goods targets are lagging. Cotton cloth, woolen cloth, and vegetable oil are exceptions, with 1950 to mid-1953 claimed rises of 33 per cent, 28 per cent

TABLE II

## SOVIET CLAIMS AND GOALS for Capital Construction in Constant Values

### Percentage Gains During Year

	1949-50 Average	1951	1952	1953 (6 mo. rate)	1950- July 1953 Total	1950-55 (Plan Total)
Gross National Material Product	19	12	11	—	—	60
Gross Industrial Output	18.5	16	11	10	35	70
Capital Construction	21.5	12	11	4	23	90-100
Incl. Fuel Industry	18.5	12	5	2	17	—
Metallurgy	17	20	11	8	37	—
Bldg. materials	14	35	9	8	52	—
Power stations	38.5	40	26	(5)	66	—
Food and light industries	15.5	—	9	8	—**	—
Agriculture*	51	6	—	—	—**	90+
Transportation	27	3	—	13	—**	63
Housing	22	20	10	7	35	100

\* Machine-Tractor Stations and State Farms only.

\*\* Apparently under 23 per cent.

TABLE III

## OFFICIAL SOVIET DATA on Additions to Agricultural Equipment 1950-1952

Item	1949	1950	1951	1952
Trucks	64,000	82,000	88,000	57,000
Tractors <sup>a</sup>	68,200	81,800	82,200	88,500
Combines	29,000	46,000	53,000	41,000
Incl. self-propelled	12,000	23,000	29,000	21,000

<sup>a</sup> Converted from "15 hp equivalent" at 33 hp per unit average.

**TABLE IV**  
**SOVIET WORKERS AND EMPLOYES**  
**1950-1955 (Partly Estimated)**

	Soviet Union					U.S. 1951
	1950	1951	1952	1953 (July)	1955 (Plan)	
Manufacturing, mining, and utilities	14.3	15.1	15.7	16.1	16.7	17.8
Construction	4.3	4.4	4.5	4.6	5.3	3.9
Transport and communications	(4.2)	(4.3)	(4.3)	(4.4)	(4.5)	3.8
Commerce	2.6	(2.7)	(2.7)	(2.8)	14.0	11.5
Education	3.2	3.3	3.4	3.4		
Health	2.4	2.5	2.6	2.6		
Others	(4.4)	(4.5)	(4.5)	(4.5)		
Total	35.4	36.8	37.7	38.4	40.5	55.9
Machine-Tractor Stations, State Farms, forestry, fishing	3.8	4.0	4.0	4.0	4.6	—
Grand Total	39.2	40.8	41.7	42.4	45.1	—

**TABLE V**  
**THE SOVIET BUDGET**  
**1950-1953 (Plan)**

Expenditures	In billion current rubles		
	1950	1952	1953 (Plan)
(1) Total	413.3	460.2	530.5
(2) Less transfer payments	374.6	418.2	452.6*
(3) Index of (2)	100	112	121
(4) National economy	157.6	178.8	192.5
(5) Health and education	79.0	80.8	86.9
(6) Administration	13.8	14.4	14.3
(7) Loan service	3.5	6.8	9.8
(8) Index of sub-total (4)-(7)	100	100	119
(9) Army, Navy, Air Force	82.9	113.6	110.2
(10) Residual: MDV plus lesser misc.	37.8	23.6	38.9
(11) Index of sub-total (8)-(10)	100	114	132

\* Includes 35.0 billion ruble "expenditures" from losses of expected revenues from price reductions (hence, sales tax reductions) on consumers' goods.

and 42 per cent, against five-year goals of 61 per cent, 51 per cent and 77 per cent, respectively. On the other hand, the announced increase of canned goods has totalled 42 per cent, against a 1950-1955 goal of 110 per cent; that of butter, 9 per cent against a 72 per cent anticipated five-year rise. Recent data on meat and leather-shoe production have been suppressed.

To summarize: The overall growth of Soviet industry, as measured by mineral output and estimated consumption, electrical power output, and freight ton-mileage, is at or only slightly below planned rates, reaching about 30 per cent between January, 1951, and July, 1953. However, examination of the spotty picture in civilian producers' goods output, and of the failure in agriculture and consumers' goods other than textiles, makes it certain that the sharp rise of munitions production was the largest factor of growth. Indirect evidence, such as the acute shortages of steel-alloying and non-ferrous metals, and the slow development of fertilizer output, supports this view.

### Investment

The rate of growth in Soviet investment is far behind plan. Monetary outlays for capital construction (from the budget and from re-invested firm profits) are to be 156.1 billion rubles, or 15 per cent higher than in 1950, compared to a planned five-year rise of 60 per cent. The anticipated rise in the Soviet index of capital construction during the course of the Fifth Five-Year Plan is 90 to 100 per cent; the rise achieved to July, 1953, has been only 23 per cent. (See Table II.)

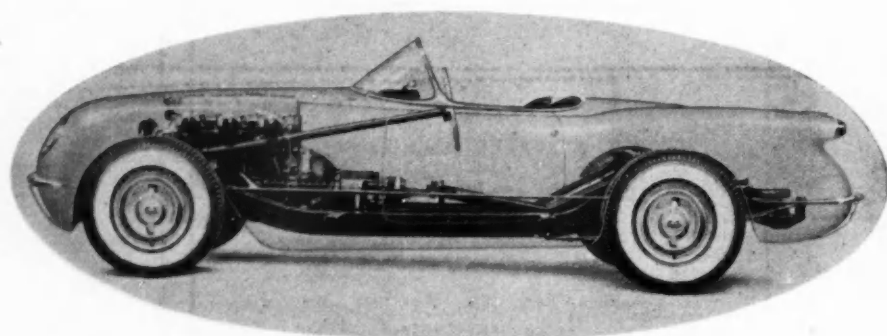
Analysis of manpower data and two recent Soviet editorials (Stroitel'stvo 1953 No. 1:3-7) clarify the major reasons for the unexpectedly slow rise in capital construction. First, the labor force engaged in construction has not been permitted to rise more than seven per cent over the 4.3 million-person strength of 1950. Second, despite the large number of engineers and technicians turned out by the U. S. S. R. since 1937, the construction industry

has few. In 1952, the former Ministries for Heavy Industrial Construction and for the Construction of Machine-Building Enterprises reported that 61 per cent and 52 per cent respectively, of the personnel holding engineering positions had practical training only. Where are all the Soviet engineers? In munitions production? In atomic energy development? In concentration camps? I do not know. Third, despite the severity of Soviet labor controls and high wages, labor turnover even in industrial construction is very high. According to Ambartsumov, current, monthly hiring is running eight to 10 per cent and firing, seven to eight per cent, of the total number of workmen. Bad housing—even for the Soviet Union!—is an admitted cause; another is undoubtedly pirating by even higher-priority enterprises. Fourth, the equipment available is insufficiently balanced, the number of large dump trucks being especially inadequate in relation to that of power shovels. Even more important is the poor maintenance of equipment and the shortage of spare parts. According to Ivanov, much of the equipment is in operation only 12 to 15 per cent of the time. In construction at the Stalin Coal Combine in the Donets Basin, seven out of 24 power shovels required 11 months each for repair. Fifth and finally, raw materials shortages (stone, sand, gravel, ceramic blocks, etc.), the paucity of containers, and transportation delays have been severe problems.

Within the field of construction, it should be noted (Table II) that power stations and building-materials plants have made the best progress, while the poorest has characterized the fuel industry, food and light industries, transportation, and agriculture. The last has been characterized by an actual drop in the accession of new equipment 1950-1952, cf. Table III. No intelligible report on this subject was made in the mid-1953 statement.

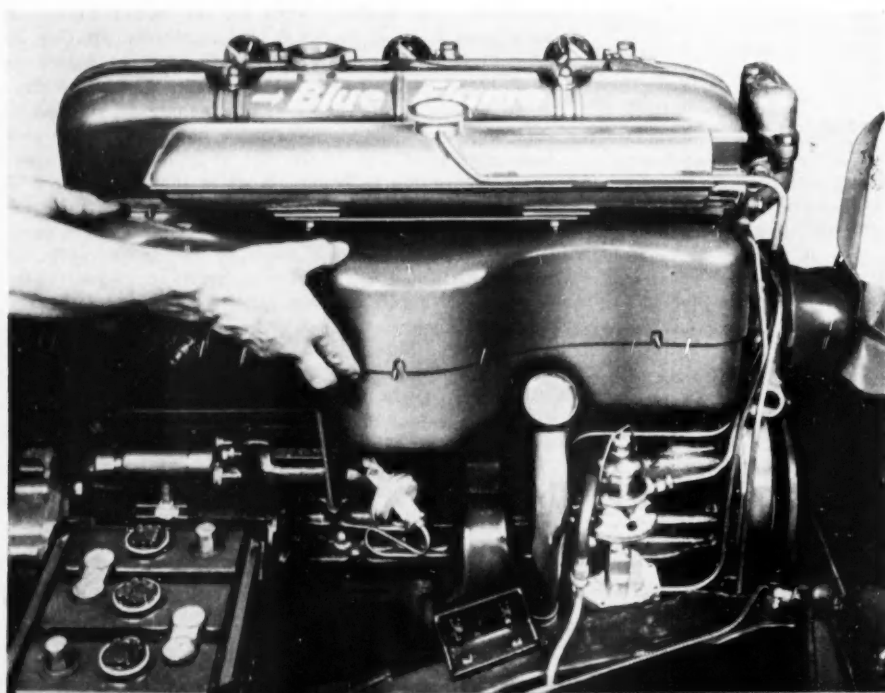
(Turn to page 160, please)

First American sports car to reach volume production, the Chevrolet Corvette, shown here in a phantom view, has a plastic body reinforced with glass fiber. The company expects to build 300 of these cars by the end of this year at Flint, Mich., and early next year production operations will begin at St. Louis with an output of 1000 cars a month scheduled.



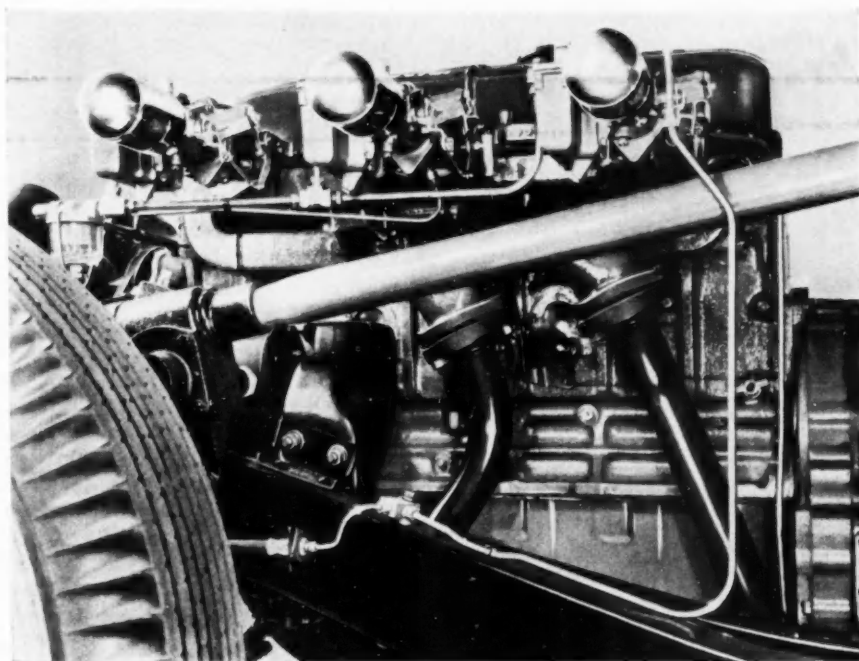
◀ Jim Custer, Editor of Automotive Industries, ready to take off in a Corvette for a test run at the General Motors Proving Ground. It accelerates from 0 to 60 mph in 11.3 sec. Wheelbase is 102 in., overall length 167 in., and curb weight 2850 lb. Height at top of door is 33 in.

## Corvette DESIGN FEATURES . .



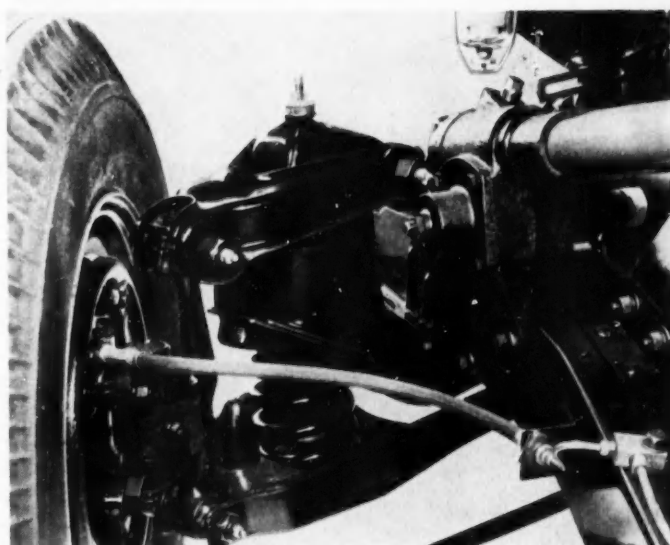
◀ Because the Corvette reinforced plastic body does not absorb electrical impulses in the manner of a steel body, this housing shields the ignition system to permit radio reception and prevent interference with nearby radio and television sets. Radio antenna is embedded in the trunk lid. Above the housing is a chrome-plated water tank for the radiator, which makes possible a low hood.



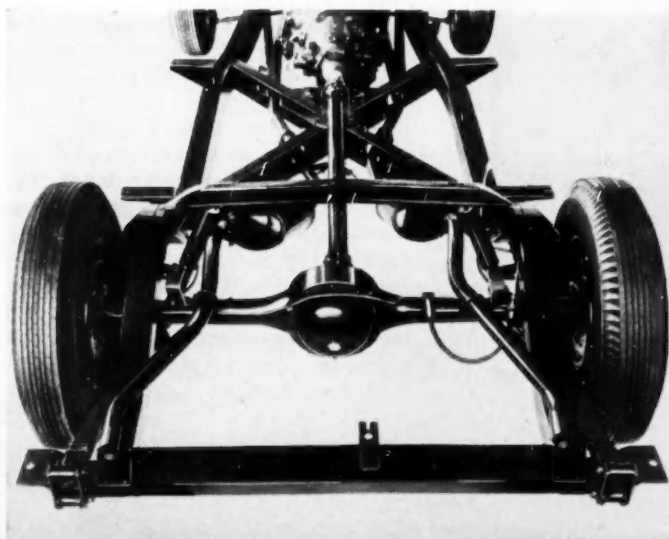


◀ The three horizontal carburetors and dual exhausts are shown in this view of the 150 hp Corvette engine. Basically the Chevrolet 235 cu in. engine, it also is equipped with high lift cams, double-acting fuel pump with vacuum booster, special alloy steel exhaust valves, dual valve springs, and cast aluminum intake manifold. Compression ratio is 8 to 1. The Powerglide automatic transmission has been modified to provide full throttle upshift at 57 mph.

Control arms of front independent suspension have large sweep back. Steering gear ratio is 16 to 1.

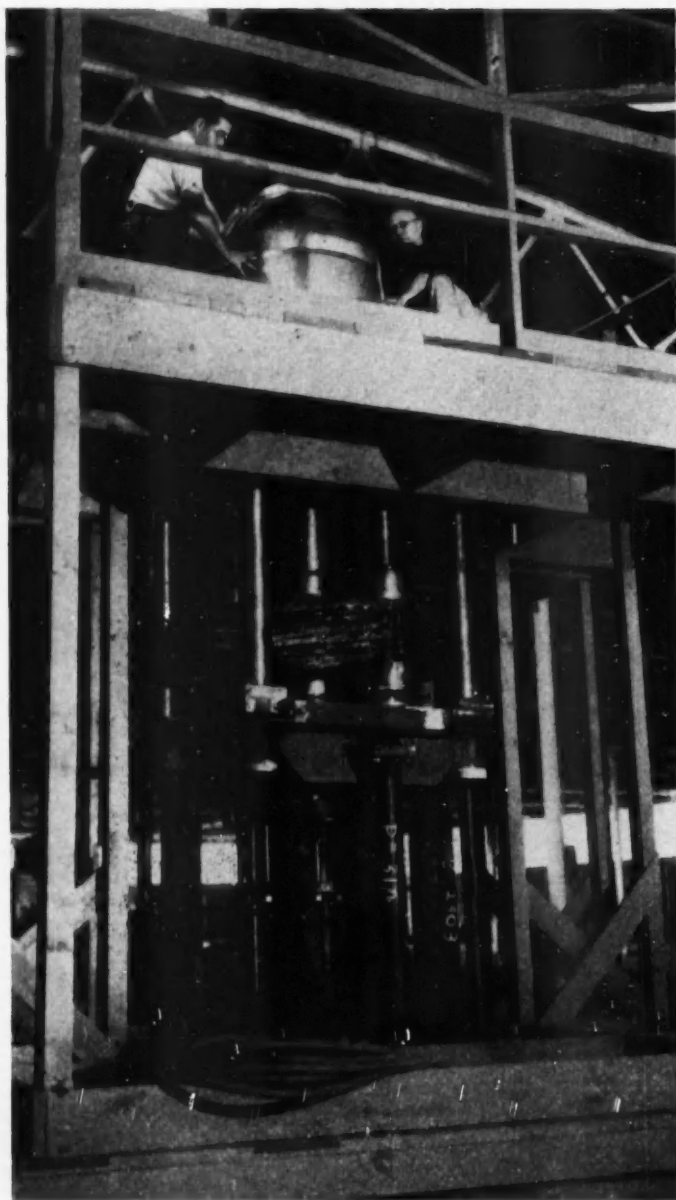


• • • • •



◀ This rear view of the Chevrolet Corvette chassis shows several distinctive features. The box girder frame is reinforced with an X-type cross member and the propeller shaft is located above it. Drive is the Hotchkiss type. Also note the dual exhaust pipes, four-leaf springs mounted outside the frame, and shock absorbers mounted to the frame cross member. The rear axle has a 3.55 to 1 ratio. The 18-gal gasoline tank (not shown) is mounted behind the seats. Tires are 6.70-15.

# Radial Forming of Sheet Metal Aircraft Parts



**This Ryan-designed tool is said to be the world's largest expanding mandrel. Normally installed in a huge pit, the machine has been pressed into immediate service above the factory floor without waiting for installation crews to catch up. Scaffolding is temporary device to give access to expanding head.**

**A**N ingenious expand forming technique for fabricating aluminum and stainless steel sheet metal parts is in operation at Ryan Aeronautical Co. Originally developed by Ryan for production of the largest external wing fuel tanks ever designed, the new method has been so successful that it is being extended to the manufacture of large components for General Electric jet engines and other turbine power plants.

With the new technique, precision forming of large contoured closed sections to exact dimensions is being accomplished. The requirement for smooth contours and close tolerance is becoming increasingly important because of the advent of supersonic jet-propelled aircraft.

The new expand forming process involves the fabrication of these contoured components by rolling the sheets into cone-shapes, which permits maximum forming with least elongation, and welding them with automatic heliarc welding machines. These fusion welds join the metal edges in a single-thickness bond of uninterrupted metal which is scarcely distinguishable from the sheet itself. Then the sections are placed over the segmented "shoes" of the expanding mandrel and stretched into shape and dimension with precise control.

The method is said to be superior to conventional techniques of forming large contoured surfaces by hammer deformation or spin forming. It does not produce the warpage, typical of hammer forming, which causes "oil can" effect. It avoids thinning the metal, with resultant loss of strength, as sometimes occurs in spinning bell-shaped sections. It affords a reliable process by which parts can be consistently and accurately duplicated. And it is more economical than conventional methods because the aluminum shoes used for forming to different contours are less expensive than other types of tooling, and no excess material is wasted as "flash" to be trimmed away.

Long used as a shop tool in the Ryan plant, expanding mandrels have been employed to size exhaust system tubes, and to form beads and similar shapes in stainless steel ducting. However, these applications are concerned with small sections which may run from three to six in. in diameter. The mandrels which perform these tasks are air pressure operated to exert forces up to 10 tons.

When Ryan tool planners were called upon to develop a method for fabricating the huge circular sections for the big Ryan wing tanks they thought of the small expanding mandrel. If the action of this tool could be adapted to the dimensions of the aluminum alloy tank, it might do the trick. No one had built a mandrel with the three to four-ft diameter required to stretch such big sections and they had never been used for this type of application. However, they drew the plans for a mandrel which would develop 568 tons of force and had it built to specifications by the National Steel and Shipbuilding Corp. of San Diego. With this machine they tried out the fuel tank forming. It proved eminently successful. Not only were the straight-sided sections stretched to exact diameter by the new tool but the elliptically-curved sections were pressed into contour with perfect results.

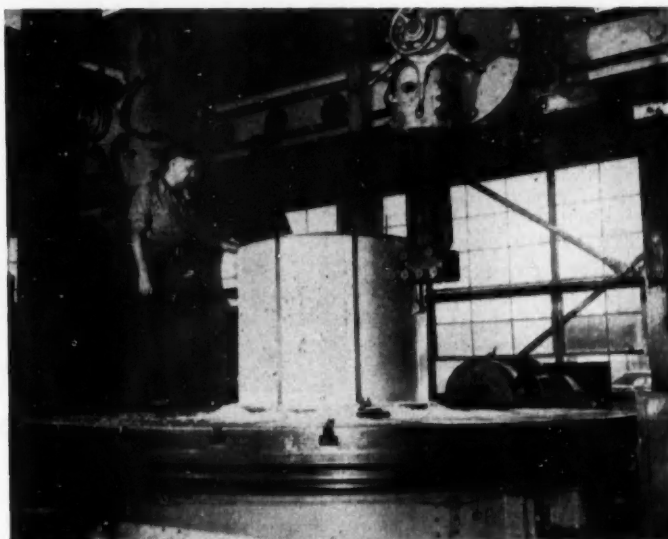
A bigger expanding mandrel, this time a 1200 ton unit which would be used to speed up production of the Ryan tank, was designed and built. Its performance was so gratifying that it was decided to adapt the technique to the building of large jet engine components.

Made from tough, heat-resistant stainless steel alloys, these parts require great force to stretch-form. To exert these tremendous pressures, Ryan engineers conceived a machine which has a 4800-ton radial force. Constructed by the Waldrip Engineering Co., of Hollydale, Calif., this massive new tool stands 17½ ft high and weighs 34,000 lb. Its three major assemblies are welded together with more than 1000 lb of weld metal.

The source of the mandrel's power is a huge hydraulic ram. Forming the central assembly, a hydraulic cylinder, 18½ in. in diameter, contains the piston which does the work. Hydraulic fluid under 5000 psi pressure is forced into this cylinder to bring it down. As it descends, the piston pulls a heavy shaft connected to a tapered pin at the top of the machine.



*Illustrative of the growing trend toward cylindrically shaped components, this view shows jet engine tailpipes and exhaust cone assemblies in foreground and fuel tank sections and heat exchangers in rear areas.*



*Machining a segmented expanding tool for one of the Ryan machines in the plant of National Steel and Shipbuilding Corp.*

This pin expands a set of eight large nickel-iron segments with aluminum alloy shoes which fit snugly around its circumference. The cone-shaped jet engine components are placed over these shoes where the radial force of 4800 tons is available to stretch them into size and shape.

A primary requirement of the tool's use is precision. To effect this, the mandrel is designed so that the movement of the main shaft is limited by four steel

*(Turn to page 94, please)*

# Latest Equipment and Methods at Lincoln-Mercury's New Assembly Plant

**L**ATEST of the basic car assembly plants of the industry to be placed in operation and surely among the most advanced in equipment, methods, and materials handling, the Wayne (Mich.) plant of the Lincoln-Mercury Division of Ford Motor Co., covers a floor space of 1,335,500 sq ft under roof. It boasts a land area of about 175 acres, thus assuring ample space for future expansion.

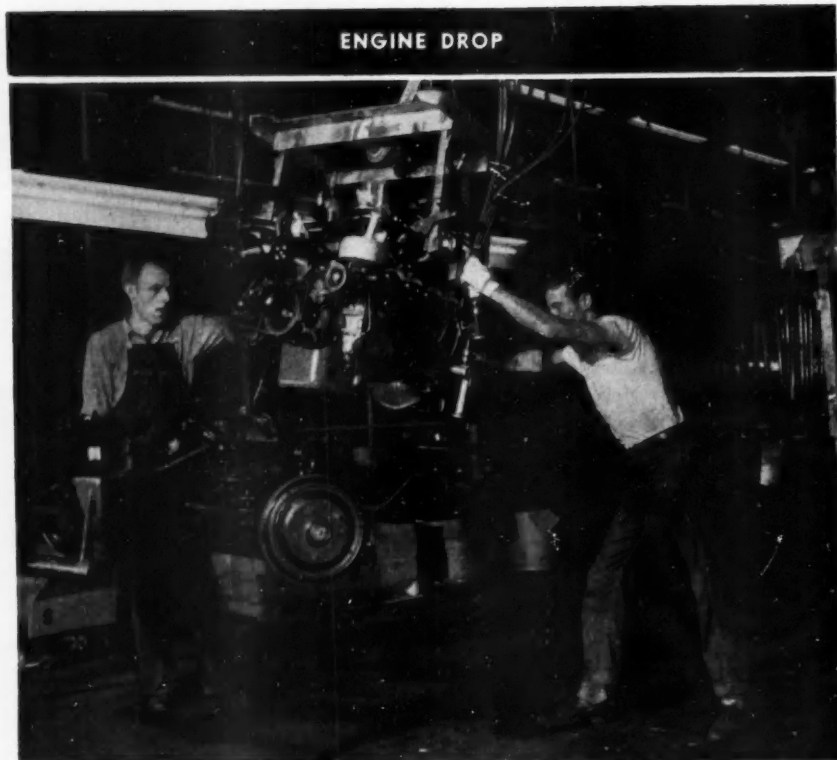
In keeping with modernity the plant emphasizes advanced materials handling methods with about 9¼ miles of conveyors installed and in opera-

— By —  
**Joseph Geschelin**

tion. Of this impressive total there are 19,770 ft of floor type conveyors and 28,170 ft of overhead conveyor lines. To this may be added a large installation of hoists and cranes as well as a fleet of industrial trucks of various kinds to speed delivery and to facilitate loading, unloading, and storing of parts and raw materials.

Generally speaking, this is a basic assembly plant for the manufacture of Lincoln and Mercury cars and is devoted exclusively to car assembly, body fabrication and body finishing. One section of the plant is devoted entirely to body fabrication, painting, and trimming, the paint shop being considered one of the most advanced operations in the industry from the standpoint of equipment and methods.

Car building on the assembly lines begins with a



ENGINE DROP

*All preliminary operations for chassis assembly are handled while the chassis is suspended from overhead conveyor.*

suspended chassis assembly arrangement, the frame being mounted initially in a special cradle, as illustrated, suspended from a heavy duty overhead conveyor line. The suspended chassis frame continues through the various preparatory operations up-side-down to facilitate the installation suspension parts, then moves through a chassis paint spray booth. The cradle is arranged to facilitate movement of the chassis around 360 deg and it is flipped over easily by hand during the painting operation.

Meanwhile, the innumerable sub-assemblies are being prepared according to schedule in other departments. For example, massive bumpers with their variety of optional features are assembled on an overhead go-round conveyor line, as illustrated, running 161 ft long. It is of particular interest to find that the



**THIS Article, the First of Two, Is Devoted to Car Assembly at the Wayne, Mich., Plant of the Lincoln-Mercury Division of the Ford Motor Co. Part II, Which Will Appear in an Early Issue of AUTOMOTIVE INDUSTRIES, Will Describe Some of the Other Interesting Operations at This New Facility**

**BODY DROP**



**Beginning of final assembly with the chassis rolling on its own wheels. Bodies are installed at this point as shown.**

assembly carrier is provided with several rows of containers filled with the small parts and fastenings required for this operation and conveniently at hand.

Special attention has been given to the organization of wheel and tire assembly with maximum automaticity wherever possible. As seen here, the wheels are delivered from the spray booth and drying oven on an overhead conveyor which traverses a gravity roller conveyor near the point of assembly with the tires. At the junction the roller conveyor is in an inclined position to facilitate automatic transfer from the overhead conveyor. The wheels then move for a short distance before entering an enclosed fixture in which they are turned over for tire mounting.

At the same time tires come in on a flat slat conveyor line, rising over the wheel conveyor, then turn-

ing to present the tires for assembly on the roller conveyor. Before leaving the conveyor the tires move through a station where they are soaped automatically. Then they are mounted in an automatic fixture and proceed to another station along the line where they are automatically filled with air.

As the wheel and tire assemblies continue on the line they reach the end station where the assembly is balanced by fitting with suitable balance weights. For the final stage, wheel and tire assemblies approach the junction with an overhead conveyor for transport to the final assembly line. At this junction the overhead conveyor dips to meet the roller conveyor and the suspended hook automatically

picks up an assembly, as shown at top of page 53.

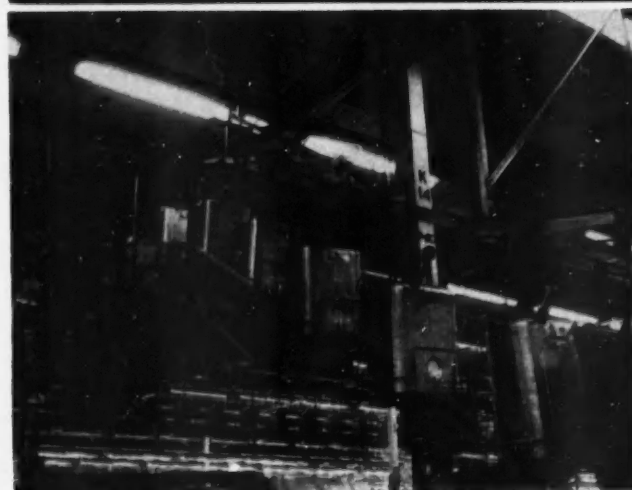
Engines and transmissions are received in another area near final assembly where the engines are completely fitted out with all necessary attachments and accessories while suspended from an overhead conveyor line. Transmissions, too, are mounted to the engine while on this line. Then the completed sub-assembly moves on an overhead feeder conveyor directly to the final assembly line. At the junction point the cradled engine is removed from the conveyor by means of an air hoist mechanism and is directed to the engine drop on a given chassis.

Beyond this point the wheel and tire assemblies meet the final line, moving on the conveyor mentioned earlier. As they approach the assembly station, they move in sets of five required for each car. However,

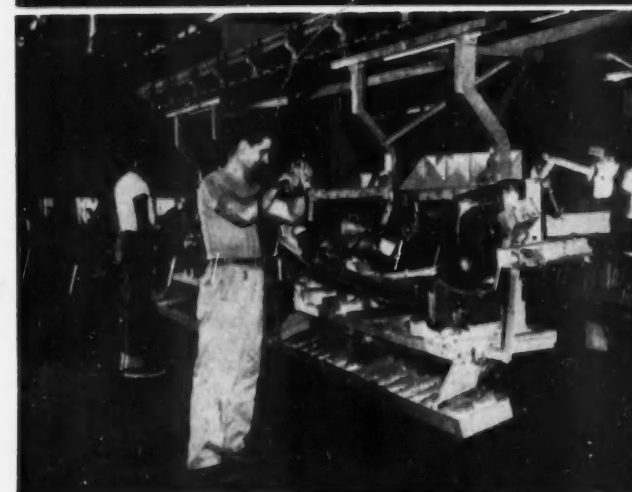
#### INSTRUMENT PANELS



#### FUEL TANKS



#### BUMPERS



at this stage there is an automatic transfer device which serves to drop three into a chute feeding one side, and two into the chute feeding the other side. It is of interest to note that after the wheels are mounted the five fastenings are made up in a single operation using an air-operated nut runner with five heads.

Now that the chassis has been fitted with wheels and tires, it reaches the stage where further assembly operations are performed on the floor conveyor with each car running on its own wheels. Here the long chassis conveyor dips to floor level, automatically disengaging the chassis, then returning the cradles to the frame line. Total length of this conveyor is 1584 ft.

Meanwhile, finish-painted bodies, completed according to schedule in the body shop, are stored on the body bank on rails to facilitate scheduling of the final assembly line. The specified body is then transported by hoist and dropped onto the chassis at the body drop. At the present writing the final assembly floor conveyor runs some 790 ft, and accommodates 47 cars from the body drop to the end of the line.

It takes the frame line two hours to reach the body drop, with 52 frames in the system during this interval. Two hours more are required for the finished car to reach the end of the final assembly line. Incidentally, the final line alone has 300 men at work.

As assembly proceeds along the final line, it reaches the point where fuel tanks are installed. For this purpose the tanks are transported and stored on an overhead conveyor line 1950 ft in length, circulating continuously until removed by the operator. Tanks are removed one-by-one and loaded into a chute which reaches into a pit under the assembly line, thus facilitating installation from underneath the car.

Meanwhile, the front end sheet metal assembly, consisting in the main of the front

#### Top—

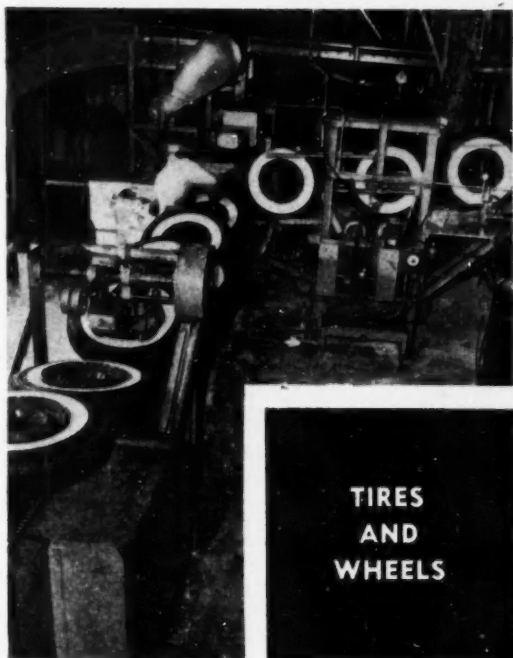
Close-up of one station on the power driven assembly conveyor for preparation of instrument panels. Note that the fixture is of trunnion type to facilitate turning of the work in any convenient position.

#### Middle—

Continuous overhead storage conveyor for fuel tanks at the Wayne plant. It dips to floor level near the point of application on the final assembly line.

#### Bottom—

Merry-go-round assembly line for bumper assembly. Note bins containing all small parts required to complete the assembly, riding with the fixture.



## TIRES AND WHEELS

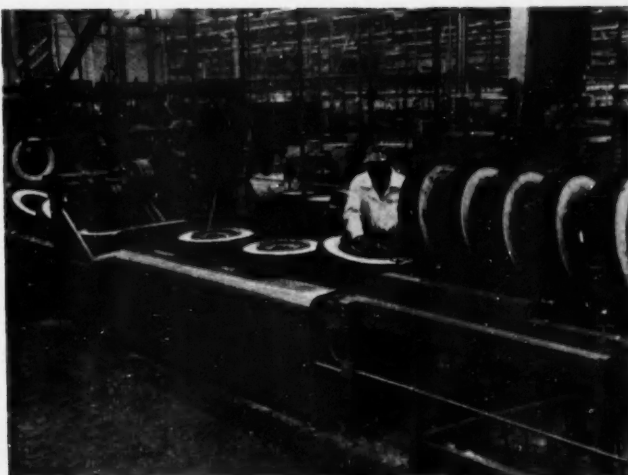
*Automatic tire and wheel assembly department. In the far background painted wheels may be seen approaching the junction on an overhead conveyor from which they are automatically transferred to a roller conveyor feeding into the line at the left. Tires come in on the conveyor at the top in the background, are looped out of the area to return through the chute seen in the background. Automatic soaping of tires is done in the fixture at the right, the middle tire in the group being soaped in this view.*

fenders, radiator, grille, etc., is built up according to schedule on an overhead conveyor line which also serves to feed the operation with painted sheet metal from the paint shop. This conveyor line is 1197 ft long. The completed front end assembly then is lifted off the conveyor and transported to the assembly line by means of an air hoist.

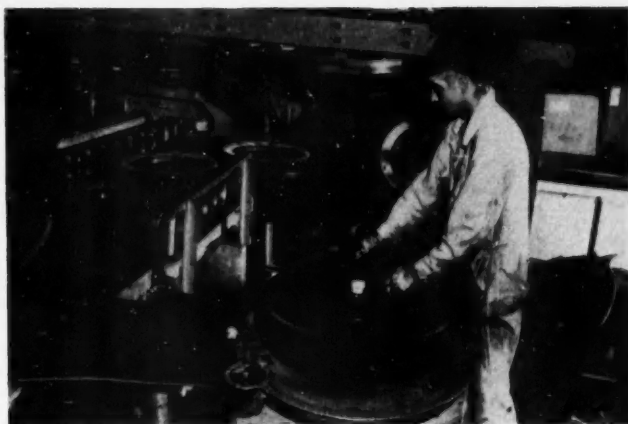
Beyond this, and to one side of the line, is a small department where instrument panel assemblies are completed and wired and ready for installation. This is done on a power-driven conveyor, shown here, fitted with trunnion type fixtures to facilitate the job. The conveyor is about 103 ft long. As in the case of other sub-assemblies, instrument panels are transported to the point of installation on a conveyor line 1223 ft long.

It may be noted in passing that other sub-assemblies such as the steering gear, steering column assembly, etc., are prepared at specific stations and transported to the assembly line at the proper place for installation.

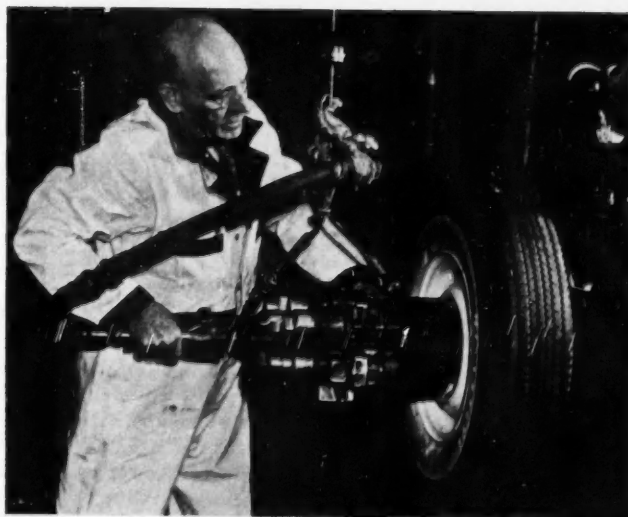
Hoods are installed after front end sheet metal is in place as the car nears the end of the final assembly line. Here the engine is  
(Turn to page 106, please)



*Tires meet wheels at the station near the extreme left where they are rolled in place automatically. The operator in the center is attaching the air hose for automatic inflation.*



*Final stage on wheel and tire assemblies is balancing. Balanced units then proceed on the gravity roller conveyor to the left. As they approach the end of the line in the background, a freely suspended hook on the overhead conveyor engages the wheel automatically and transports the assembly to the final line.*



*The five wheel fastenings are tightened simultaneously, using the special air-driven nut runner shown here.*



One of the many bomb-proof hangars now in use in Sweden.



Main entrance tunnel to an underground aircraft plant.

By  
Hans G.  
Tonndorf

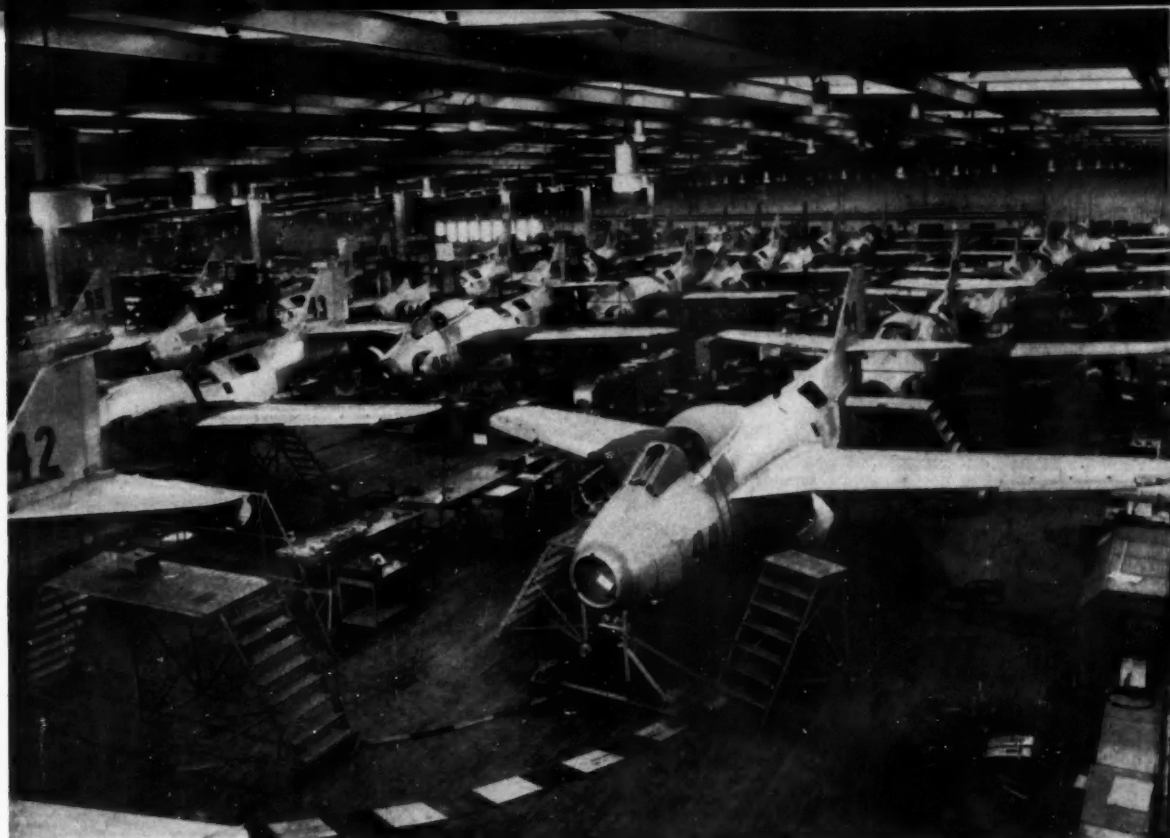
## Sweden's Aircraft Industry

**B**EING the outpost of the Western World in Northern Europe, Sweden maintains an air force of considerable and growing strength. Although no official data are available, Sweden's first-line combat planes two years ago were estimated at 1200, most of which were jet fighters. The air power of this small nation is backed up by a domestic industry of high efficiency. Working hard to cope with pressing military commitments, the Swedish aircraft indus-

try, while turning to export markets for some of its manufacture, has transferred the production of its non-military aircraft to companies in the Netherlands. With about 10,000 persons engaged in aeronautical production, the industry is fairly small by American standards, but from a technical and quality point of view it certainly deserves international attention.

Considering the military importance of the Swedish aircraft industry, everything possible is being done to protect it against air attack. One obvious precaution





*Assembling Saab-29 swept wing jet fighters.*

has been to move underground. Saab did so during the war and has decided to stay there.

In 1942 more than 5 million cu ft of granite were blasted out to give room for Saab's underground factory, now comprising more than 20 air-conditioned departments. In addition to the workshops, store-rooms, offices and dining-rooms are housed below the ground.

Variations in temperature are slight, working conditions are excellent, and the turnover of labor has

World War I, and indeed, even earlier. It would, however, not be unfair to date the birth of the modern Swedish aviation industry to the year 1937 when Svenska Aeroplan AB (Saab) was established. Two years later the company took over the aviation division of the Svenska Järnvägsverkstaden (Swedish Railway Works). The head office and the main part of the production were then concentrated to Linköping, 150 miles south of Stockholm, and the company also runs a plant at Trollhättan and an apparatus factory at Jönköping.

In those pre-war days there was already an aircraft engine factory, AB Nydquist & Holms Flygmotorverkstaden (later reorganized into Svenska Flygmotor AB) of Trollhättan, which for a number of years had made Bristol radial engines under license. Whereas Saab was largely financed by the famous Swedish armament concern of Bofors, Flygmotor has belonged since 1941 to

the Volvo group, the biggest automobile manufacturer of the country. Saab employs today between 5000 and 6000 persons, Flygmotor about 1600, but both companies make great use of subcontractors among affiliated and independent manufacturers.

After having built foreign planes on a license basis during the first few years, Saab in 1941 was ready to deliver the first aircraft of its own design, the Saab-17, to the light bomber and reconnaissance units of the Swedish Air Force. New models followed while

## Operates Underground

proved to be lower than in comparable above-ground plants. There are 21 meteorological instruments, indicating weather, so that employees are not taken by surprise when leaving the plant in the evenings.

At Trollhättan, Svenska Flygmotor has followed Saab's example and built its own underground plant. Everything possible has been done to secure an uninterrupted flow of aircraft production, even in the event of war.

Aircraft were manufactured in Sweden during

production facilities continued to expand. In 1943 the Saab-21, a pusher-propelled fighter and attack plane with a top speed of 400 mph, the world's first service aircraft with ejector seat, made its debut.

### An "All-Jet" Air Force

The significance of jet developments was early realized. Outside the group of the Great Powers, the Swedish aircraft industry was the first to enter this field. Today the entire Swedish production of combat planes is made up of jet aircraft, and in this line Sweden probably ranks fourth in the world after USA, Great Britain and the Soviet Union.

In the middle of 1946 Sweden obtained the first shipment of British-made D.H. Vampires. Later Flygmotor delivered a series of license-produced D.H. Goblin engines for an improved Vampire version, the MK 50, a large number of which were contracted for the Swedish Air Force. Early in 1947 Saab was ready to test its first jet-fighter, the 21 R, a Goblin-powered development of the twin-boom Saab-21A, a pusher-propelled fighter. It provided the company with valuable experience in the making of high-speed aircraft.

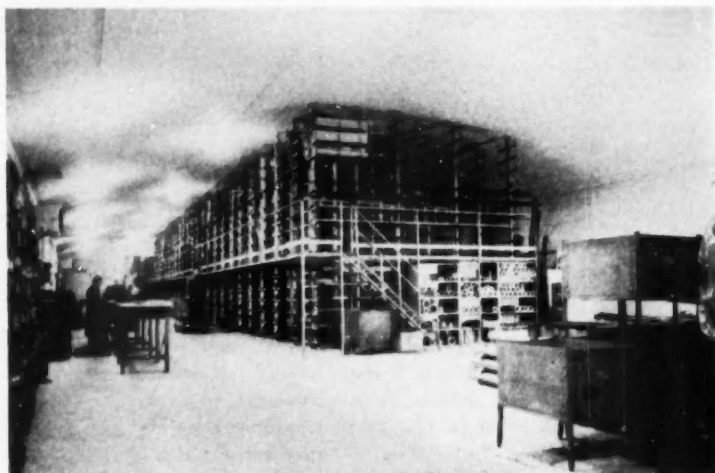
The Saab-29, popularly referred to as the "Flying Barrel," represents doubtless one of the greatest achievements of the young Swedish aircraft industry. Test-flown in September, 1948, and delivered to Air Force units since the spring of 1951, it was the first European swept-wing jet fighter put into large-scale production. It has a top speed of 650 mph and is considered comparable with the American F-86 Sabre and the Russian MiG-15. Unofficially it has

been reported that the Swedish Air Force has ordered 600 planes of this type.

While the 29 will remain in production for some time to come, Saab is now tooling up for quantity pro-



*View in one of the underground aircraft factories.*



*Aircraft components are stored in special racks in underground plant.*



*A single-engined light bomber, the Saab-17, is fitted with retractable ski undercarriage.*



*Saab-21 R, a Goblin-powered, single engined jet fighter early model developed from a pusher propeller fighter.*

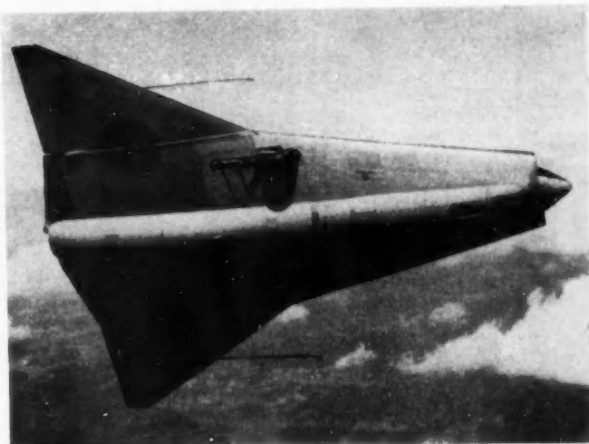
duction of its latest product, the 32, called Lansen. It is a two-seat all-weather jet, larger and even faster—700 mph—than its predecessor, designed primarily to re-equip most attack units of the Air Force. With its heavy armament of guns, rockets and "other modern weapons," it is able, from a centrally located base, to reach any point of the 1250 mile long coastline of Sweden in less than an hour and in any kind of weather. The Saab-32 represents the biggest design job ever ventured by the company. It is also the first aircraft, the lines of which have been determined by a Saab-developed 100 per cent mathematical method. Use has been made of a specially built Swiss coordinatograph which for the first time has been applied to aircraft production, making lofting four times quicker than by hand.

Sweden has also been doing some experimenting in delta aircraft. Compared with the delta-wing aircraft of the United States and Great Britain, the Saab-210 Draken is unusual, as the aspect ratio is remarkably low. All main components are of Swedish design except the engine, which is a British Armstrong-Siddeley Adder axial-flow turbojet. It is believed that Draken is a forerunner of a coming Swedish supersonic fighter.

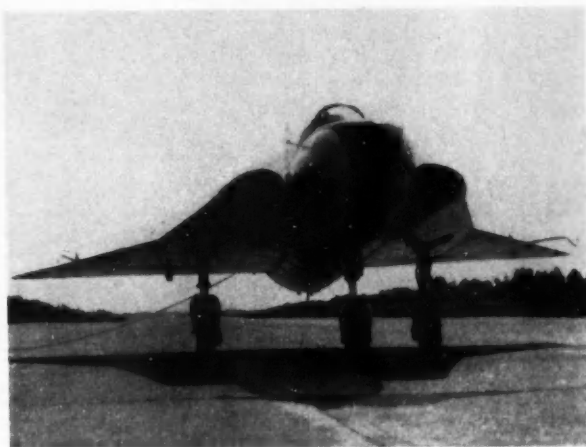
### Jet Engine Project Abandoned

Practically all engines used in Swedish-built planes have been supplied by Svenska Flygmotor AB, and almost all of them have been produced on a license basis. During the war years a great number of Pratt & Whitney R-1830 Twin Wasp 14-cylinder engines were made. No license was available at that time and the engine was copied from two scrap engines but the patent issue was settled after the end of the war.

In the postwar jet planes, British-designed engines have been used. In the Saab-21, a D.H. Goblin 3 of 3300 lb static thrust was installed, whereas the 29 is powered with a D.H. Ghost of 5000 lb thrust. The future production of the new model of



The Saab-210 Draken which has an extremely low aspect ratio.



Modified form of the Saab-20 Draken. This research delta has a special high speed air intake.



Saab-91 B made by De Schelde Co. of Dordrecht.

Lansen will be powered by a Flygmotor-built Rolls-Royce Avon axial-flow turbojet. Although no thrust figures have been revealed for the Avon version to be built in Sweden, it is known that the latest British-produced Avon develops 7500 lb thrust and 9500 lb with afterburner.

It had long been the ambition of the Swedish engine industry to develop engines of its own designs, particularly suited for Swedish requirements. For several reasons these efforts have produced no visible results. During the war years Flygmotor worked on a 24-cylinder aircooled engine of 2800 hp. With the setting-in of the jet age it was not considered worth while pursuing this project and the engine never reached the production stage.

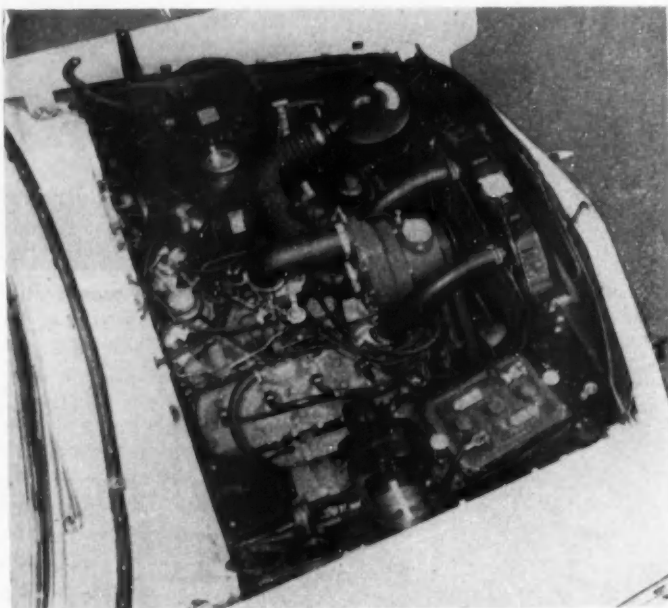
In the early development of jet engines, Swedish scientists made valuable contributions. In 1936 Professor Alf Lysholm patented a centrifugal gas turbine design. Whereas the turbine manufacturer STAL (Svenska Turbin AB Ljungström) obtained an Air

(Turn to page 92, please)

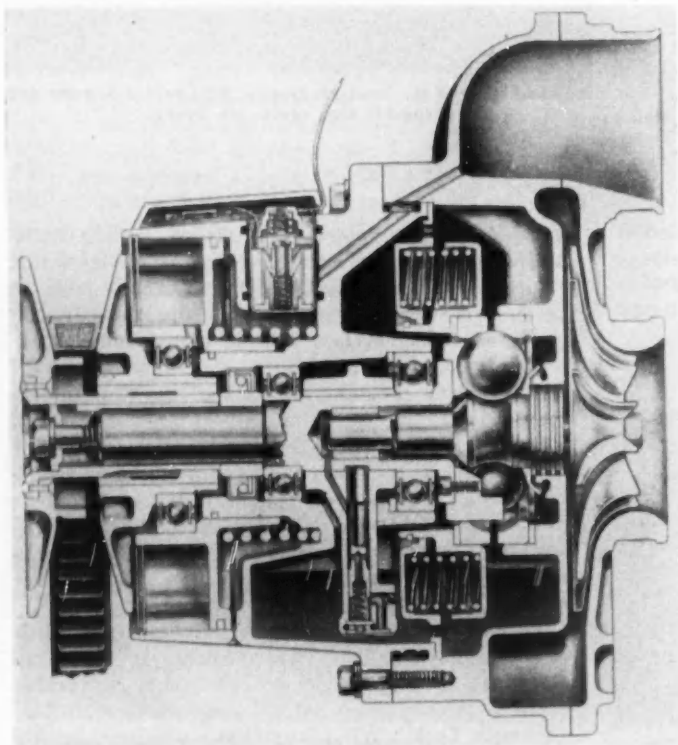
# Construction and Operation

*of New*

## McCULLOCH SUPERCHARGER



Supercharger assembly installed on a Ford.



Longitudinal sectional view of the Model VS-57 supercharger.

A NEW supercharger designated VS-57, recently introduced by McCulloch Motors Corp., Los Angeles, incorporates a number of unique features. Among these is a variable speed drive which permits the impeller to rotate at lower speeds until extra power is desired. The drive is controlled by engine manifold pressure so that the supercharger shifts to high speed when the throttle is opened, delivering maximum pressure for the power increase. Letting up on the accelerator automatically shifts the supercharger back to a lower speed so that the unit is again in standby condition. This arrangement is said to enable the device to deliver maximum air pressure at comparatively low engine speeds. In order to protect the supercharger and engine against excessive speeds, the shift to a lower speed is made automatically when supercharged air delivered to the carburetor exceeds five psi pressure or if impeller speed exceeds 30,000 rpm.

Operation of the variable speed drive is as follows: A 1 to 1.7 variable-ratio pulley, the inner flange of which is moved axially by an air piston, provides the changes in speed. Movement of the air piston is controlled by a solenoid valve actuated by manifold pressure. High manifold pressure (open throttle) shuts off air supply to the piston, permitting the two flanges of the pulley to separate, thus reducing its effective diameter and putting the unit in high speed. Low manifold pressure (part throttle) opens the solenoid valve, permitting air supply to reach the piston which then brings the two pulley flanges closer together. This increases the effective diameter of the pulley, putting the supercharger in low speed.

*(Turn to page 119, please)*





One of several Ford Motor Co. truck docks equipped with the roller conveyor system.

Interior of truck equipped with roller conveyors. In the foreground are roller conveyors on the loading dock.

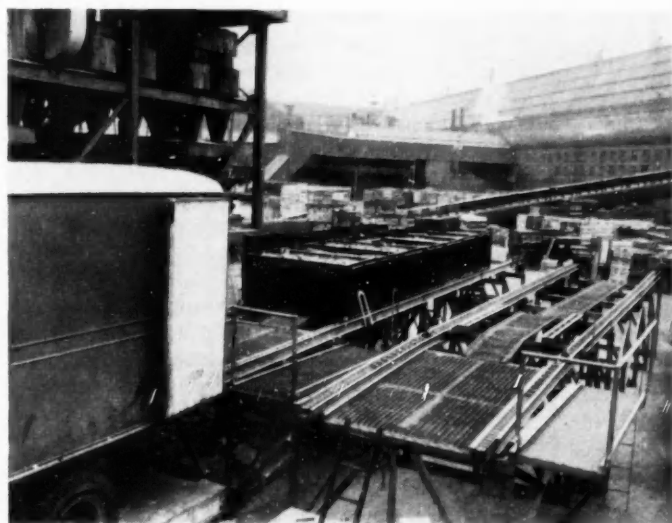


## TRUCKS

with  
**Built-In**

## Roller Conveyors

.....



Free-standing conveyorized loading and unloading stations are used at some of Ford's Detroit-area plant locations.

A MATERIALS handling system, which, in effect, links widely separated plants by roller conveyors, has been developed by Ford Motor Co. The system now is in use at nine Ford plants in the Detroit area and currently is handling over 3400 tons of materials a day.

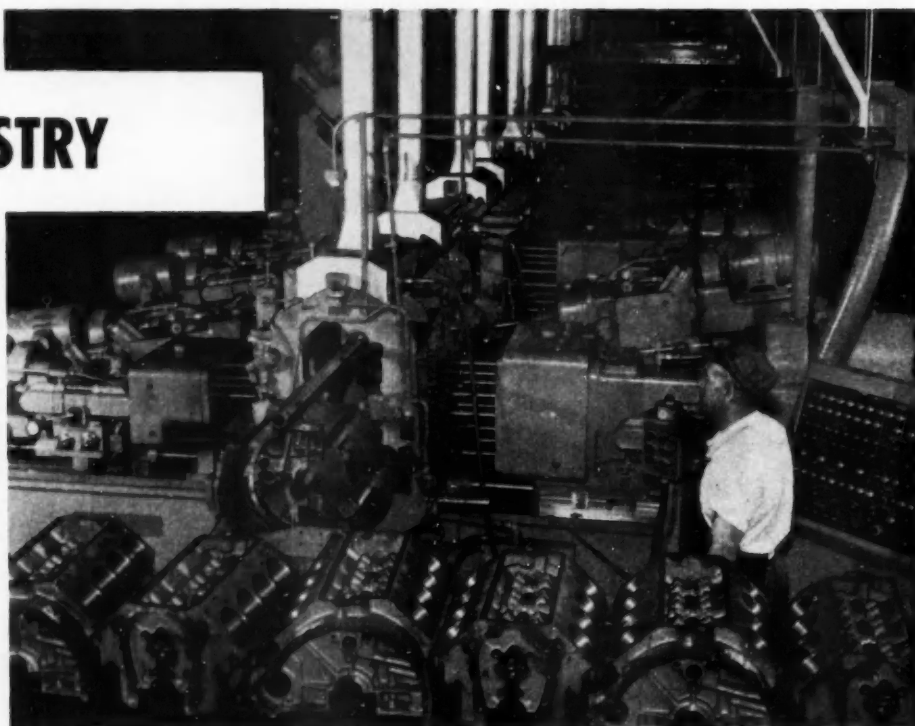
The conveyors are used for handling of a wide variety of automotive parts which normally are transported by company trucks from one plant to another in standard racks or standard skid bins. By conveyorizing the truck loading and unloading operations where a large volume of such parts must be moved, time spent by trucks at dock-side is substantially reduced, fewer trailer trucks can handle a given quantity of material in the same time, and fork trucks are not tied up at both ends of the system in unproductive waiting. With the system a 30,000-lb load can be put aboard a trailer in 10 minutes. As much as an hour and a half would be needed for loose-loading the same trailer.

The system consists of three elements. The first is specially constructed and equipped loading and unloading docks.

(Turn to page 104, please)

# INDUSTRY

FOCUSES  
INTEREST  
ON



## NATIONAL METAL SHOW AND CONGRESS

**P**REPARING for the keen competition ahead, hundreds of companies and other industrial organizations will participate in the 35th National Metal Exposition to be held October 19-23 at the Cleveland Public Auditorium. Upwards of 50,000 executives, engineers and designers will search the 460 industrial exhibits for equipment and services to lower costs and improve quality of their products.

The exposition will present every phase of the metals industries from mine to mill and factory, with nearly five acres of floor space being used for the purpose. Equipment will range from multi-ton heavy duty machines to devices weighing less than a pound. Many of these new products and equipments are described and illustrated beginning on the next page.

Concurrently will be held the National Metal Congress. The American Society for Metals and the American Welding Society will hold morning, afternoon and evening technical sessions. The ASM will start with its annual Seminar on Saturday and Sunday, October 17-18, based on the subject, "Relation of Properties to Microstructure." The Metals Division, American Institute of Mining and Metallurgical Engineers, has scheduled daily technical sessions Monday through Wednesday. The Society for Non-Destructive Testing will hold sessions Monday through Thursday.

The eighth ASM Metallographic Exhibit will be a part of the exposition during the week. Eleven classi-

fications of micros have been designated for this contest. Another feature will be the display of current reference sources and services by the Special Libraries Association. In addition to field trips to Battelle Memorial Institute and Warner & Swasey, the SLA will sponsor meetings of Thursday and Friday.

J. B. Austin, Director of Research Laboratories, U. S. Steel, Kearny, N. J., will be installed as new ASM president; George A. Roberts, Chief Metallurgist, Vanadium-Alloys Steel, as vice-president.

The following will take office at the annual meeting of the American Welding Society: President—F. L. Plummer, Director of Engineering, Hammond Iron Works. First Vice-President—J. H. Humberstone, President, Ohio Chemical and Surgical Division, Air Reduction Co. Second Vice-President—J. J. Chyle, Director Welding Research, A. O. Smith Corp.

The ASM Medal for the Advancement of Research will be presented to Hiland Garfield Batcheller, Chairman of the Board, Allegheny-Ludlum Steel Corp. William T. Ennor, Assistant Director of Research, Aluminum Research Laboratories, Aluminum Co. of America, is the 1953 winner of the Albert Sauveur Achievement Award established by ASM. Mr. Ennor developed the directly chilled ingot for large scale production use. Dr. George Sachs, Director of Metallurgical Research, Syracuse University, is the recipient of the ASM 1953 Gold Medal Award.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

## D-C Arc Welder

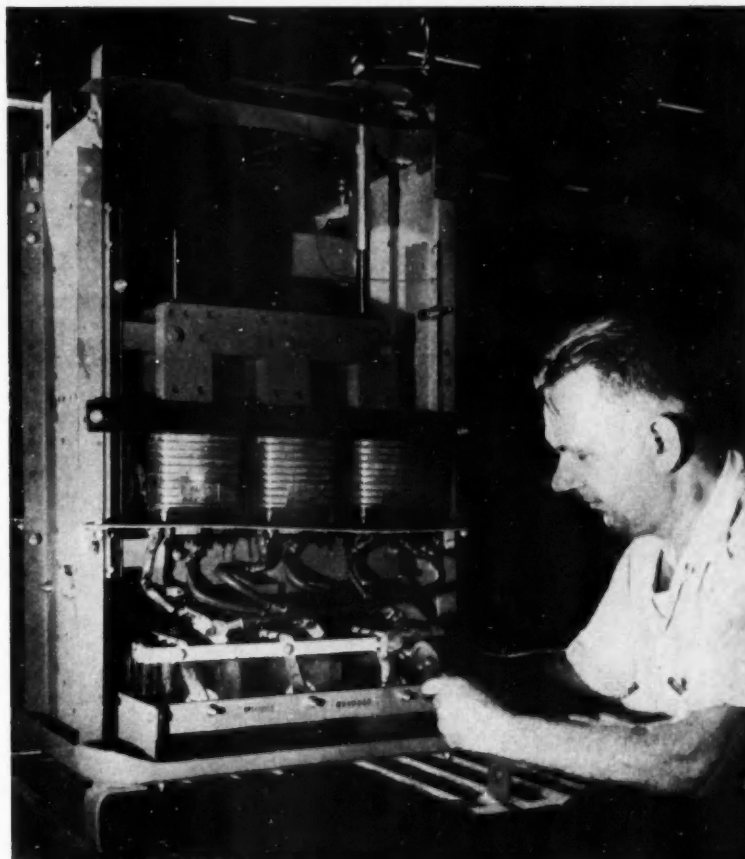
Reductions in size and weight, and increases in ease of maintenance and user and operator convenience are advantages claimed for a selenium rectifier d-c arc welder.

The heart of this welder consists essentially of two parts: a three-phase, full-wave selenium rectifier and a so-called Transactor unit, which is a combination three-phase transformer and movable core reactor. The Transactor unit has two, three-phase laminated cores of aluminum. One is a fixed core on which the primary and secondary coils are wound. The other is divided into two parts—a stationary core, and a movable core.

Axial-flow ventilation, with the fan located in the very top of the unit and the air intake located at the very bottom, permits incoming air to flow vertically through the welder, following natural convection. Overload protection guards the welder from damage when it is overloaded from operating at an excessive duty cycle or without the ventilating fan.

A special control feature eliminates arc shorts during welding applications requiring a short arc. It supplies instantaneous current surges when the arc begins to short out, thereby clearing the short and re-establishing the arc.

Although the three standard sizes of this welder are 200, 300, and 400 amp, Duplex models are available in 300/600 and 400/800 amp ratings.



Westinghouse d-c arc welder with case removed.

Essentially two smaller units mounted on a common bedplate and enclosed in a single case, the Duplex unit can be used as a single unit or as two

units, each with half the capacity. Westinghouse Electric Corp., Booth 1611.

Circle 56 on page 81 for more data

## Cut-Off Machine

An abrasive cut-off machine, known as the Radiac Type P Traveler, will be placed on display. This machine, for dry cutting only, is equipped with a 10 hp motor which is operated by a magnetic starter and a remote control push button mounted on the wheel guard.

The wheel spindle is driven by seven vee-belts and the machine is arranged to operate an 18 in. diam by 1/4 in. thick Resinoid bonded wheel, at a spindle speed of 2500 rpm. Two sets of wheel flanges are provided—eight in. and four in. in diameter.

Base of the machine consists of

two heavy angle irons, securely bolted to the journal bracket and the vise table. Tapered dowel pins are used to keep all parts securely in place.

One of the features of the machine is its portability. A. P. de Sanno & Sons, Booth 2101.

Circle 57 on page 81 for more data  
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For additional information, please use postage-free reply card on page 81

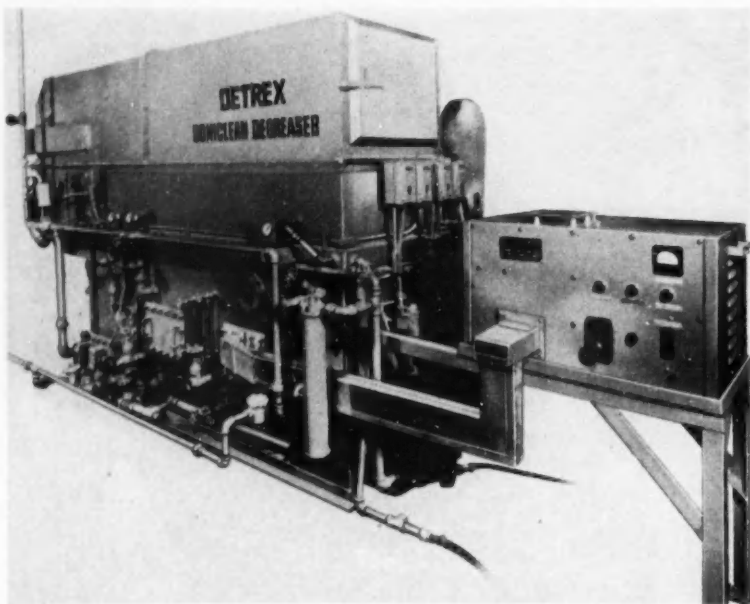
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### Metal Cleaning Process

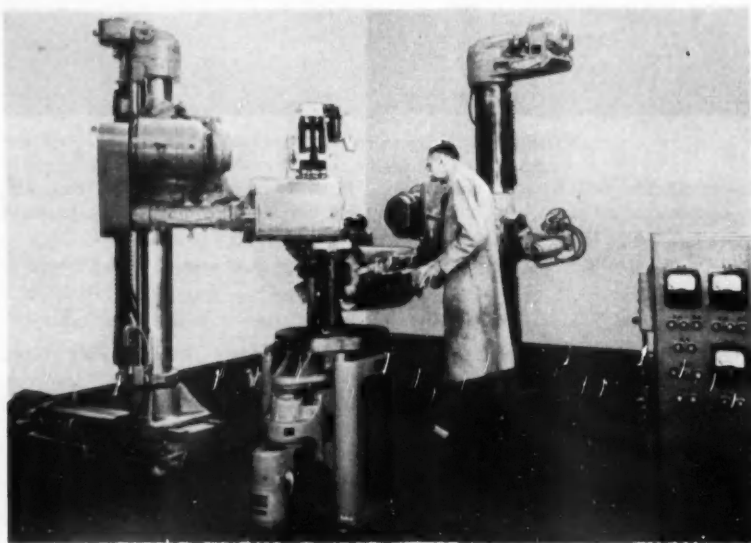
In operation at the manufacturer's booth is a Degreaser machine demonstrating the Soniclean metal cleaning process. It makes use of sound en-

ergy in an elastic medium, in this case trichlorethylene solvent.

The process can be applied to non-absorbent materials such as metals,



Detrex Degreaser using Soniclean process.



Operator brushes a jet gear on Osborn Model No. 5 brushing machine.

glassware, and molded products. Even difficult soils such as buffing, lapping, and honing compounds are readily removed. It is claimed that even iron oxide residues can be readily removed to a degree previously not obtainable. *Detrex Corp., Booth 1807.*

Circle 58 on page 81 for more data

### Protective Finishes

On view will be two finishes known as Parcolac Black and Parcolac Aluminum. They have been developed to supply the need for phenolic type finishes with added corrosion resistance and distinctive color.

These two finishes are especially useful over Parco Compound on iron and steel parts which are expected to withstand severe exposure or to operate under adverse atmospheric conditions. The rest of the manufacturer's line will also be shown. *Parker Rust Proof Co., Booth 2305.*

Circle 59 on page 81 for more data

### Brushing Machines

To be shown for the first time are new power brushing methods for removing burrs and blending surface junctures and other finishing jobs of large or heavy work pieces. Two brushing machines, Models Nos. 4 and 5, will be demonstrated.

The new methods are said to take the time consuming hand work out of burring and finishing large parts. The operation of the brushing machines are so easily learned that an unskilled operator can attain high-quality, rapid production quickly.

On the No. 5 brushing machine, for example, the entire job of the operator is placing the work piece on the turntable. Once this is completed, his job is complete until the work is brushed and ready to be removed as the brushed gear is removed, and unfinished gear is placed on the turntable, and so on. A pre-set timer retracts the brushing heads and motion is stopped until again actuated by the operator.

The amount, direction and quality of brushing each gear receives depends on the type of gear, metal, surface desired and type and methods of application of the brushes. The operator simply loads and unloads, all other operations can be pre-determined and pre-set. *Osborn Manufacturing Co., Booth 1030.*

Circle 60 on page 81 for more data



## Jig Borer

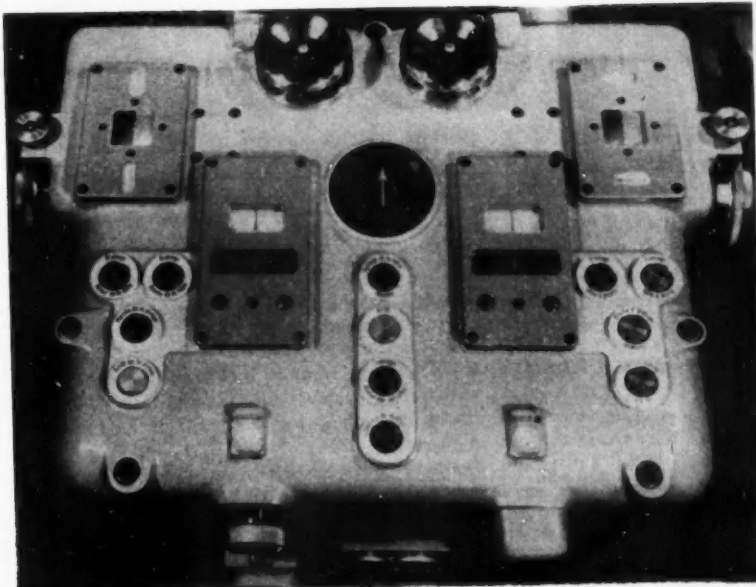
Initial settings for precision jig boring operations can now be made consecutively for each hole in the workpiece with a speed and accuracy formerly possible only with methods for duplicating previously made settings, by means of a preselective Autopositioner incorporated in the latest Model LB 15 Lindner jig borer, according to the American Distributor.

With the Autopositioner, an operator can preselect the table position for the next hole while one boring operation is in progress. An optical projection system of making settings, in conjunction with a photoelectric zero point indicator, permits exact centering.

Speed and accuracy of the preselected table positioning are made possible by the optical-photoelectric centering devices, two of which are included in the Lindner Autopositioner, one for longitudinal table position, the other for transverse. An illuminated projection screen with an integral reticle shows an image of the desired location line from the cylindrical measuring scale. As this image approaches the reticle, the photoelectric system is energized, and a pointer swings in the direction of the optical image. As the image approaches the center of the reticle, the pointer follows its motion. When the image is exactly centered, the pointer also reaches center position.

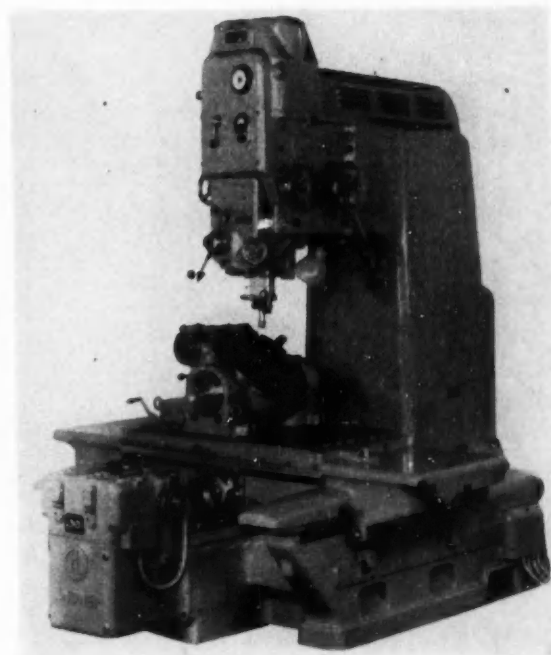
By means of a switch on the Autopositioner, either one of two methods can be chosen for the preselection of table settings: the coordinate method, in which the positions of all holes are expressed in terms of their distances from a fixed zero point; or the additive method, in which each hole is positioned by its longitudinal and transverse distance from the preceding hole. Basic principles of operation of the Autopositioner are the same in either case. Kurt Orban Co., Booth 2308.

Circle 61 on page 81 for more data



Selective Autopositioner for initial settings in Orban-distributed optical jig borer.

Lindner Model LB 15  
jigborer distributed by  
Kurt Orban.



## Welding Positioner

To be shown is a three-action (rotation, tilt, elevation) welding positioner. A wide choice of models having manual or powered actions is offered.

Model X21 is the basic machine with precision table rotation from zero to 2.25 rpm with micrometer speed control and automatic magnetic brak-

ing. Table tilt is 135 deg with ball-bearing manual handcrank, or, with Model X21P, powered to tilt full range in 23 sec with automatic magnetic braking.

Model X21 has 24 in. elevation travel with ball-bearing handcrank capable of lifting full load, or, with Model X21E, powered to elevate the full 24 in. in 15 sec. It is equipped

with automatic magnetic braking.

Model X21PE is the designation for the positioner having all three actions motor driven. Controls are dust-tight, oil-tight, and operate on low voltage safety circuit; limit switches are precision adjustable. Aronson Machine Co., Booth 2435.

Circle 62 on page 81 for more data  
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For additional information, please use postage-free reply card on page 81

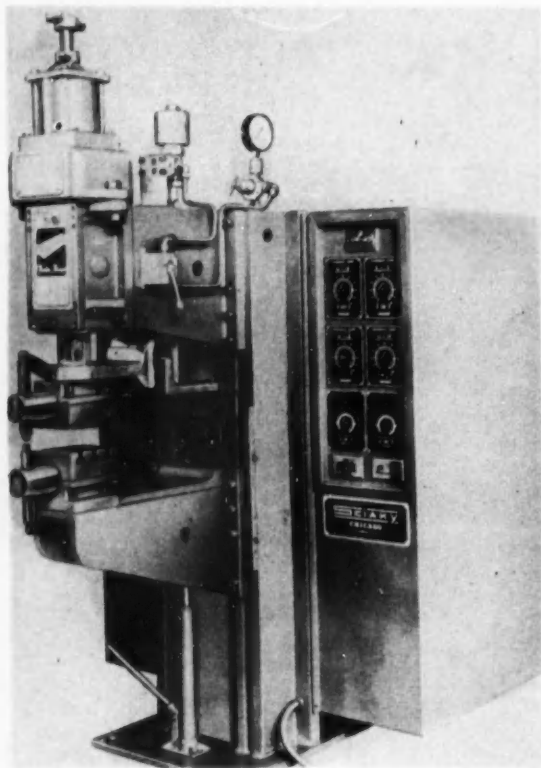
(Continued from page 63)

### Projection Welder

Among a line of resistance welders to be shown will be the EPT 2 machine. It is one of a series of three-phase projection welders available in 50 kva, 75 kva, and 100 kva at 50 per cent duty cycle. The EPT 2 comes in 12, 18 and 24-in. throat depths and

thicknesses of stainless steel in minimum gages of .022 in. and maximum gages of .125 in. It will spot weld aluminum and other light alloys (to commercial standards only), minimum gages of .025 in. and maximum gages of .102 in. *Sciaky Bros., Inc., Booth 2106.*

Circle 63 on page 81 for more data



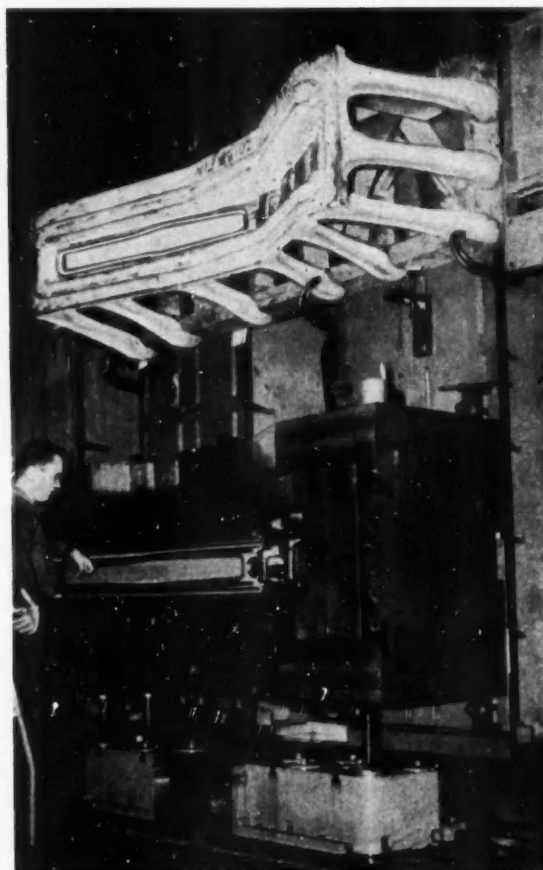
*Sciaky projection welder.*

maximum electrode force of 4000 lb.

The EPT 2 can be supplied as a combination projection and spot welder. The combination welder (the ESPT) will make high quality spot welds on large production runs on two thicknesses of clean mild steel in minimum gages of .020 in. and maximum gages of .203 in.

The ESPT 2 will spot weld two

*U. S. Gypsum plastic tooling.*



### Resin Tooling

Hydromite UF will be one of the features of the exhibition. While the outstanding property of this tooling medium is surface hardness—it is also characterized by the ease with which it can be fabricated, and the relatively low cost.

Especially designed for die sinking patterns and other tooling and pattern making applications, Hydromite UF has the surface smoothness and hardness of most plastic resins.

It is a combination of synthetic resins and other plastic materials in powder form. Used according to directions it is self setting to a strong, dense, hard product. It combines the major advantages of synthetic casting resins and gypsum cements.

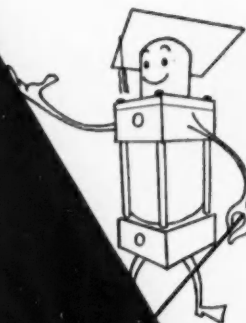
Hydromite UF can be screened, built up in the form of a splash cast, or poured over patterns and models made of plaster, wood, metal or plastic. *U. S. Gypsum, Booth 707.*

Circle 64 on page 81 for more data  
(Turn to page 180, please)

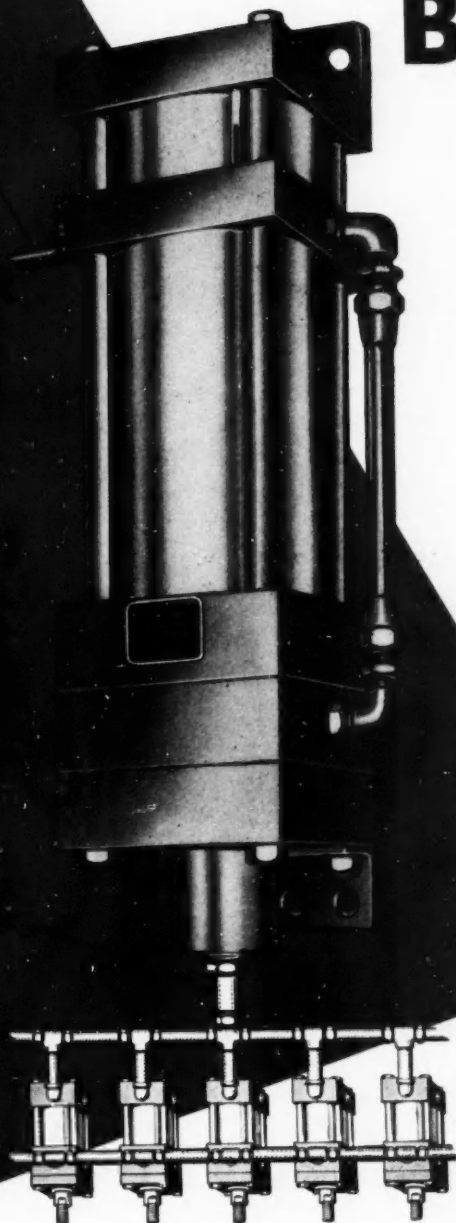


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## *...when you **LEAD** them, that's game in the BAG*

You have to shoot *ahead* of fast-moving game, if you want to take home something for dinner. Same with business. Now's the time to plan for the day when you can get all the materials you want, with allocations gone, orders maybe not so plentiful, and competition red-hot. ● Allegheny Stainless Steel can work marvels in adding sales advantages to the products you make, or reducing operating costs in the equipment you use. Let our Development Engineers show you how.

*Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*



Warehouse stocks carried by  
all Ryerson plants

You can make it **BETTER** with  
**Allegheny Metal**





## Compact, powerful, custom-built A.C. or D.C. motors for ELECTRONICS and ELECTRO-MECHANICS

Wherever you need electric motors for maximum power in minimum size, Pesco has the basic co-ordinated frame sizes and power elements you'll require.

**For example**—Pesco motors are now in use for: cooling (blowers for electronic equipment), tuning (radios and automatic finders), scanning antenna (civilian and military), antiaircraft radar fire control, as well as pump drives and mechanical actuators.

By using standardized parts in a series of six co-ordinated frame sizes, Pesco can provide you with electric motors for electronic applications with voltages from 6 to 120 volts D. C.; from 1/100 to 6

H. P. for operating speeds up to 15,000 R. P. M. Special, high-altitude design will operate from  $-65^{\circ}$  to  $+165^{\circ}$  F.

Pesco high-frequency A.C. induction motors, squirrel-cage type, are built in a series of 5 co-ordinated frame sizes to meet horsepower requirements of .01 to 9.0, at 400 cycles per second.

Motors in these frame sizes can be built for *your* specific frequency, using standard parts to obtain the speed and power rating desired. Consult our Engineering Department concerning your requirements. Strictest confidence—and no obligation, of course!



BORG - WARNER CORPORATION  
24700 NORTH MILES ROAD • BEDFORD, OHIO



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As the pioneer of hydraulic valve lifters, and the major producer of hydraulic lifters for 25 years, Eaton is equipped by both experience and production facilities to meet the particular requirements of each engine. Eaton Hydraulic Valve Lifters are available in all types and in all materials, including heat-treated steel, hardenable iron, chilled face, and puddled face types.

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**EATON PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# SELF-LOCKING "PLACE" BOLTS

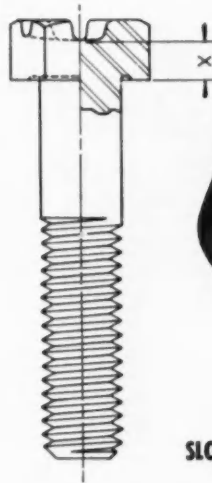
## ... cut costs ... add strength

... wherever involuntary loosening or fatigue are a problem!

In some typical automotive and farm equipment applications, for instance, "Place" Bolts are being used as connecting rod bolts, main bearing cap screws, and flywheel bolts.

Here, and wherever a locking bolt may be needed, the Slotted-Type "Place" Bolt offers not only positive locking action but economy and additional strength. It cuts costs because no additional parts or operations are needed. It adds strength because its controlled spring action guards against impact, shock and fatigue failures.

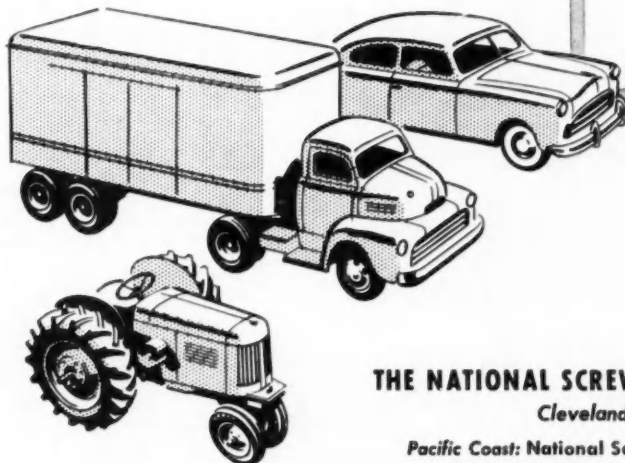
National makes the Slotted-Type "Place" Bolt in carbon or alloy steel, in any of a wide range of sizes. Write us for additional information, including our illustrated folder.



**HERE'S HOW  
SLOTTED-TYPE HEAD LOCKS**

The flexible diaphragm formed between slotted segments in the upper face of bolt head and circular recess adjacent to the shank in lower face (section X) acts as controlled spring element when head is properly wrenched against a rigid seat. Diaphragm is reinforced by the continuous-grained segment cold formed between upset slots in upper face.

U. S. Patent No. 2543705



**THE NATIONAL SCREW & MFG. COMPANY**

Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.

3423 South Garfield Ave., Los Angeles 23, Cal.



FASTENERS



HOVELL CHAINS

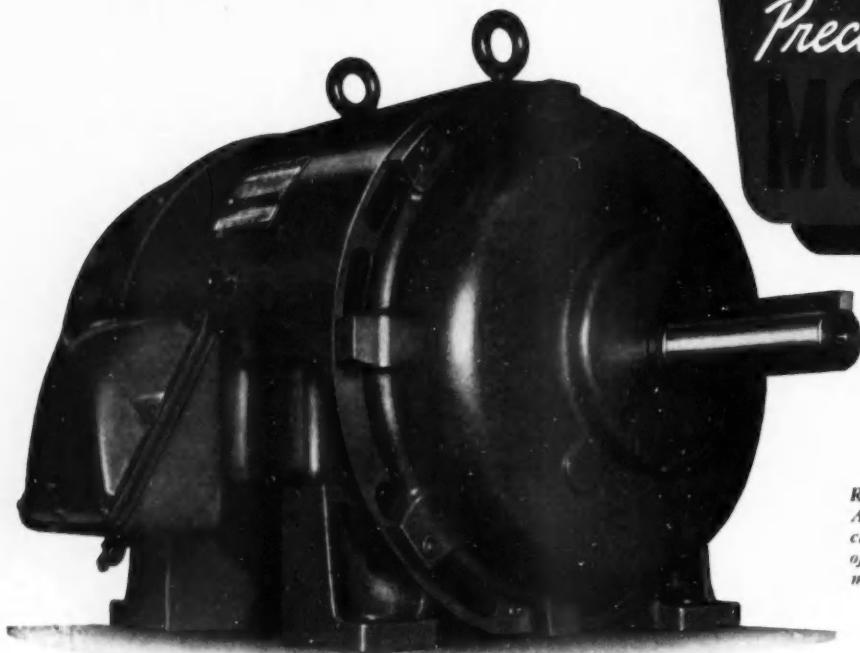


CHESTER HOISTS



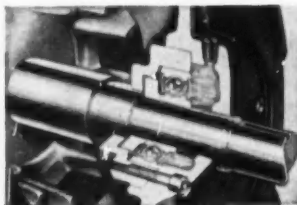
# FOR RUGGED SERVICE...

*"All motors are  
NOT alike!"*



*Reliance Totally-enclosed Fan-cooled A-c. Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from 3/4 to 300 hp.*

- ☆ Heavy shafts, bearing to bearing
- ☆ Indestructible pressure-cast rotors
- ☆ Shock-resistant frame and bearing-bracket construction



#### ... AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—you just can't grease'em wrong! To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1468 J

## RELIANCE ELECTRIC AND ENGINEERING CO.

1123 Ivanhoe Road, Cleveland 10, Ohio • Sales Representatives in Principal Cities



# News of the MACHINERY INDUSTRIES

By Thomas Mac New

## Machinery Prices Relatively Low

A recent study made by the Machinery & Allied Products Institute shows that between 1939 and July, 1953, while prices of all industrial commodities increased by 98 per cent, and wages in machinery and equipment industries by 157 per cent, prices for machinery and equipment rose only 75 per cent. During the same period, the iron and steel products used by the capital goods industries rose in price by 111 per cent, non-ferrous metals by 131 per cent, fuel and power costs by 80 per cent, and construction costs by 190 per cent.

As shown in the table on this page, the gap between machinery and equipment price increases and increases in other price indexes was most pronounced before the onset of the Korean war. By June, 1950, machinery prices had risen only 48 per cent above their 1939 level, as compared with much greater increases for other commodities.

The Institute states that the rapid rise in demand for machinery and equipment in the defense program led to a movement in machinery prices during the past few years more nearly comparable to other commodities. This price movement was also caused in part by the rapid reconversion to mobilization and the associated difficulties in maintaining a steady flow of raw materials and labor into the machinery industries.

## Housecleaning

From the F. E. Anderson Oil Co., we learned of new sales approach for its chemical machining solution, Lusol. The object is to sell the customer "good housekeeping" to increase output, tool life, and product quality.

The whole intent is to sell a prospect on the idea of cleaning out a machine thoroughly—getting all of the foreign material out of sumps, piping and crevices—before the Lusol machining solution is put in. This

cleaning operation should then be repeated at regular intervals thereafter, to prevent odors and the formation of dirt that may accumulate in the machine, regardless of the coolant used.

According to company reports, much dermatitis and odors have been eliminated, and tools are lasting longer.

The coolant maker is now working on an educational program to make the machine operators conscious of the fact that they, too, must share in the program.

## Military Tools

According to AI's Washington office, the Pentagon is in no hurry to spend the \$250 million voted by Congress to purchase machine tools, other heavy production equipment, and the machinery for handling them and their products. Reason given is that most of the equipment would go into reserve storage against emergency. Top brass wants first to get a sound inventory of what equipment and storage facilities the Government now has before earmarking the fund for more.

## Canadian Plant

Ex-Cell-O Corp. will extend its operations to Canada, according to

**Machinery Prices  
Have Not Increased  
in Proportion to Costs  
of Other Commod-  
ities and Wages. Ex-  
Cell-O Starts Cana-  
dian Operations.**

H. Glenn Bixby, Ex-Cell-O president. A wholly-owned subsidiary, Ex-Cell-O Corp. of Canada, Ltd., has been formed and negotiations have been completed to acquire by purchase all of the assets, except cash, of Henry Power Tools, Ltd., and Crafttools, Ltd., both of London, Ontario. The transfer of the properties will be effective as of November 1.

At the present time Henry Power Tools and Crafttools are engaged in light and heavy machining work, miscellaneous jobbing, foundry work and produce a line of home workshop power tools. Ex-Cell-O of Canada will continue the present operations except the power tools business which has been sold to Strongridge Ltd. of London, Ontario.

It is expected that the London plant will soon start producing some of the standard Ex-Cell-O products, such as drill jig bushings and railroad pins and bushings. In the future the list of standard Ex-Cell-O products manufactured in Canada will be expanded. Buildings are being enlarged and additional equipment is being installed to increase manufacturing capacity.

John Gilchrist, president of the former Canadian firms, will continue as an officer and managing director of the new organization.

(Turn to page 108, please)

Percentage Change in Prices and Wages Between Selected Dates

	1939 to July 1953	1939 to June 1950	June 1950 to July 1953	July 1953 to July 1953
<b>PRICES</b>				
Machinery & Equipment	75.5%	48.0%	18.6%	2.9%
All Commodities except farm and foods	97.6	75.9	12.3	2.0
<b>RAW MATERIAL COSTS</b>				
Iron and Steel	111.2%	76.2%	19.9%	10.9%
Non-ferrous metals	130.7	85.8	24.2	1.9
Fuel and Power	80.1	65.7	8.7	5.0
<b>WAGES</b>				
Machinery except electrical	161.4%	112.2%	23.2%	6.0%
Electrical machinery	152.1	106.6	22.0	6.6
<b>CONSTRUCTION COSTS</b>				
	189.7%	148.8%	16.4%	4.5%

Source: Machinery & Allied Products Institute, based on material from the U. S. Department of Labor, except construction costs from the American Appraisal Co. and the U. S. Department of Commerce.

# NEW EQUIPMENT

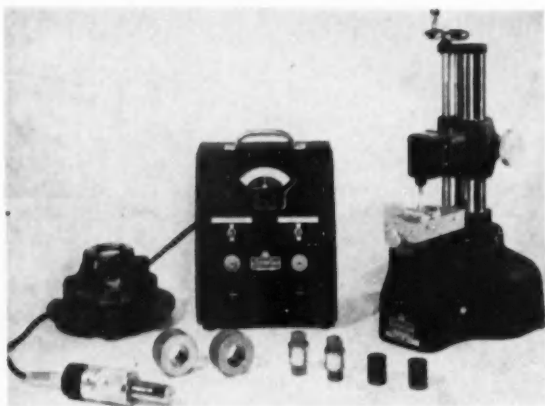
PLANT • PRODUCTION

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## Gaging Equipment Shows Piston Clearance

An Electrolimit hand gage and Electrolimit external comparator to-

gether with a DOU meter has been combined to form a radial internal



*Pratt & Whitney radial internal clearance comparator with max and min masters.*

clearance comparator for industry.

In operation the clearance comparator is claimed to be easily handled. The Electro-limit hand gage is used to measure the I. D. of the cylinder, while the piston O. D. is checked on the external comparator. The DOU meter in the cabinet indicates the exact clearance between the two selected parts. Both hand gage and external comparator are set to minimum and maximum masters.

The DOU meter has a total scale of 0.002 with each graduation equal to 0.0001. The instrument cabinet contains the power units magnification and zero adjustment and DOU meter. Pratt & Whitney, Div. Niles-Bement-Pond Co.

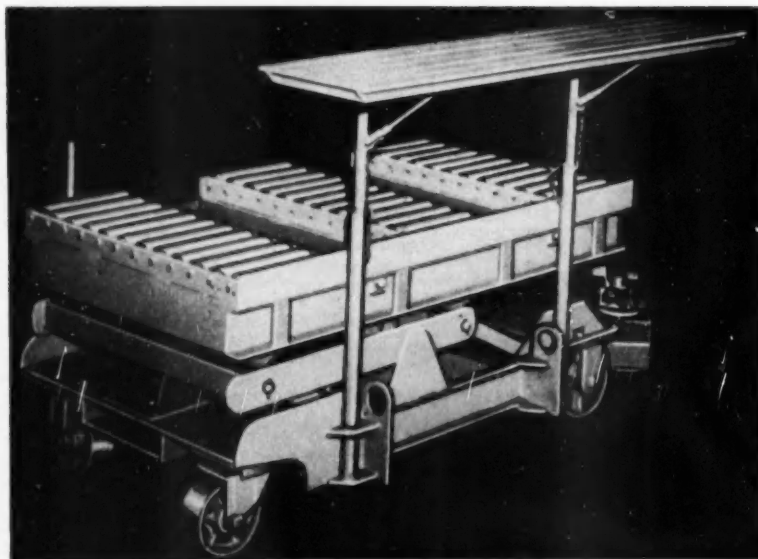
Circle 41 on page 81 for more data

## Sheet Feeding Table for Continuous Feeding

By adapting a roller top and special feed shelf to a standard model sheet feeding table, a mechanism has

been developed to provide a continuous flow of sheet steel for press operations.

A bundle of strip steel 16 in. high



*Raymond continuous sheet feeding table.*

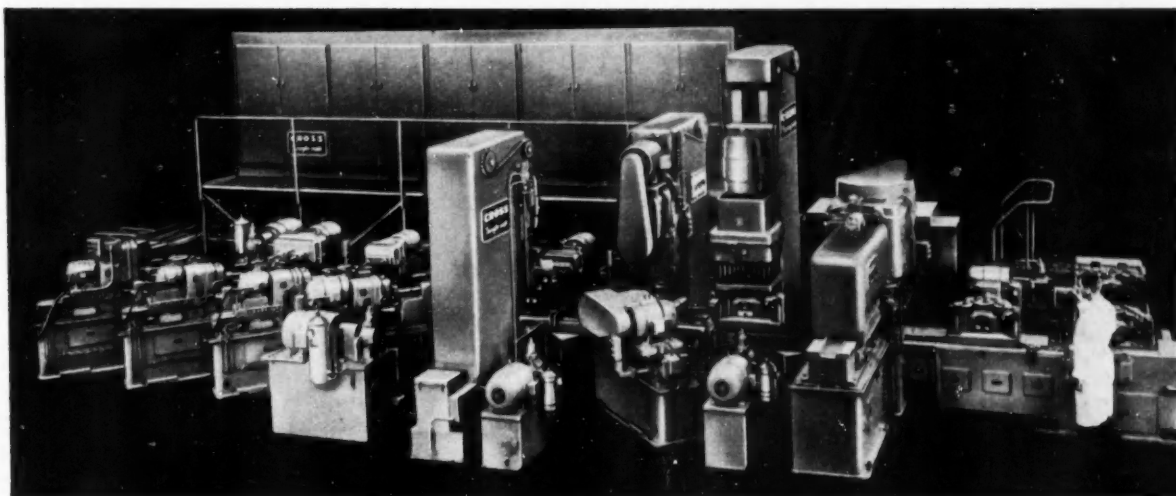
by 15 in. wide by 72 in. long is placed on the roller top by use of a fork truck or overhead crane and pushed forward manually leaving room for a second bundle of reserve stock. The table is elevated by means of the hydraulic foot pump so that the top sheet of the inside bundle is slightly above the fixed height shelf. Single sheets are transferred from the pile onto the shelf and fed lengthwise into a punch press.

When the inside bundle has been used up, the table is lowered and the outside bundle moved forward to start another feeding cycle. Another bundle of strips is placed on the outside of the table top as reserve stock.

The feeding shelf has pin adjustments so that it can be used with presses having different bed heights.

The elevating table has a capacity of five tons. It is mounted on large casters so that it can be moved into position and it is also fitted with crane lugs so that it can be moved from press to press. Raymond Corp.

Circle 42 on page 81 for more data



*Cross Transfer-matic for processing V-8 manifolds.*

### Over Three V-8 Exhaust Manifolds Machined Every Minute

Right and left V-8 engine exhaust manifolds are completely machined on a Transfer-matic type machine tool. With parts automatically transferred from station to station, the machine performs 42 milling, drilling, boring, chamfering and tapping operations.

Exhaust manifolds are finished at the rate of 230 (115 right and 115 left) per hour at 100 per cent efficiency, according to the maker.

The new machine has 10 stations—one each for loading and unloading; three for milling; three for drilling; one for boring and one for tapping.

Following are outstanding features: Palletized work holding fixtures with power wrenches for automatic operation.

The Cross-Drive for milling cutters. Built-in chip conveyor and automatic removal of chips from fixtures

after each cycle of the machine tool.

Pre-set tools for reducing downtime and minimizing scrap by practically eliminating the trial-and-error method of set-up.

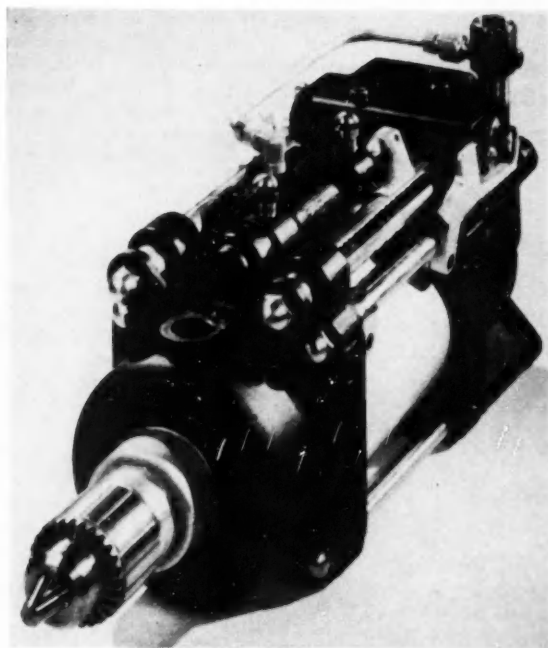
Automatic lubrication.

Hardened and ground ways.

Hydraulic and electrical construction is to Joint Industry Conference standards. *The Cross Co.*

Circle 43 on page 81 for more data

### Automatic Air Drill Has Four In. Stroke



*Hausc Model 14 air operated Holomatic drill.*

The Holomatic drilling unit which has been introduced to the market weighs 30 lb. and accomplishes single and multiple feed rate operations. Powered by compressed air, hydraulically fed, it is suitable for automatic or manual cycle control.

Stroke is adjustable to four in. with ample thrust for  $\frac{1}{2}$  in. diameter drilling in steel. Positive stop with a dwell or instantaneous retract operation; continuous cycling, skip drilling, back feeding and manual jogging are achieved.

Rotary air motors, available in a variety of capacities to  $\frac{3}{4}$  hp and speeds of 500 to 15,000 rpm, give the Model 14 Holomatic an extremely wide working range. These drill units can be arranged to suit various requirements, and can be mounted in horizontal, vertical or angular planes. *Hausc Engineering.*

Circle 44 on page 81 for more data

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**NEW**

**EQUIPMENT**

**PLANT • PRODUCTION**

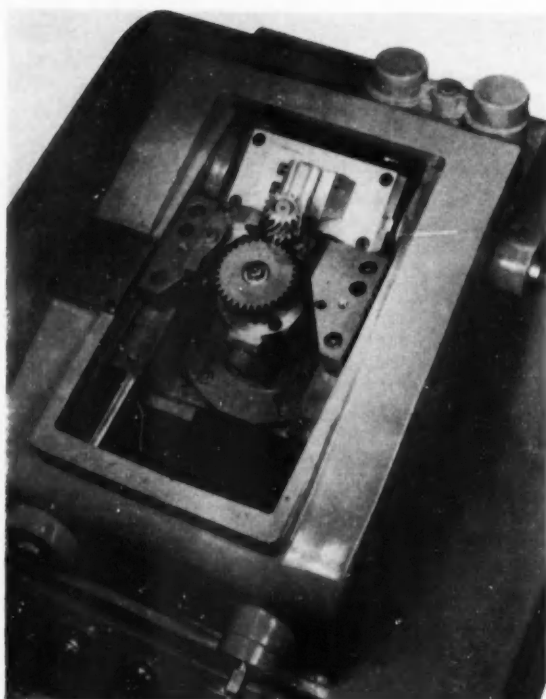


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(Continued from page 73)

### Universal Gear Chamfering Machines

Universal high speed gear burring and chamfering machines are being introduced which burr and chamfer the entire tooth form of both helical



Safety cover removed from the gear chamfering machine to show tooling.

and spur gears from  $\frac{5}{8}$  to  $9\frac{1}{2}$  in. pitch diameter, as well as external straight and involute form splines.

To chamfer both sides of the tooth and the root on one side of a gear, it is claimed to take less than one-fifth of a second. Translated into pieces per hour, floor-to-floor, the Universal Burr-Master will finish gears with 22 teeth at a rate of more than 600 per hour, at 80 per cent operating efficiency.

Tooling consists of a pilot gear, work holding fixture, tool block and form cutter. In setting up for a given part, the tooling is developed for the gear to be burred and chamfered and precisely located on the mounting faces of the machine.

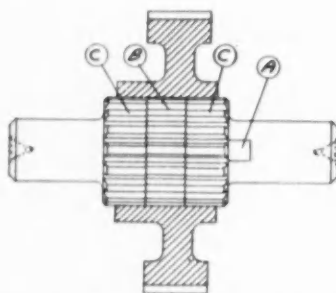
The precision-ground tool holder is keyed in two directions. Four socket-head screws hold the tool block in position. The work-holding fixture is located on the fixture-mounting rails and positioned over hardened and ground dowels.

Machines are driven by a  $\frac{1}{2}$ -hp motor, with two motors used on the two-station machines. The motor pulley is belt-connected to a second pulley, which in turn is belt-connected to a third pulley mounted on a spline cross shaft. A bevel gear on this shaft meshes with a second spline shaft which carries the sliding index worm that operates the index worm gear. The worm gear shaft carries the pilot gear. All ratios are 1 to 1 starting with the spline cross shaft up to the pilot gear.

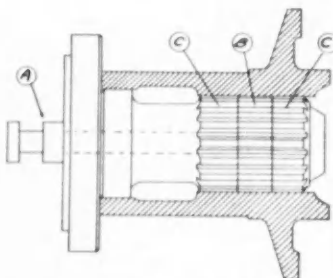
An over-riding clutch located in the final pulley hub prevents damage to the cutter or machine in the event of jamming for any reason. Once the jam is cleared, the machine resumes operation with the assurance that perfect gears will be produced. *Modern Industrial Engineering Co.*

Circle 45 on page 81 for more data

### Pitch Line Concentricity Arbor



Inspection arbor for use between centers—(A) Manual adjustment for rotating splined section (B); (C)—solid or removable section of arbor.



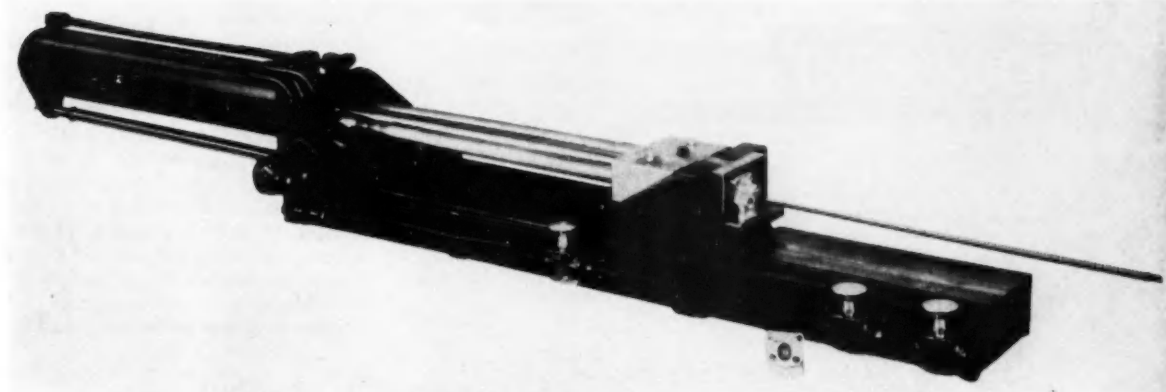
Stub arbor for turning and facing with draw bar attachment—(A) Draw bar attachment for rotating splined section (B); (C) solid section of arbor.

Now available is a line of pitch line concentricity arbors and chucks that are offered for control of close tolerances from spline pitch diameters to face, shoulders, bores and external or internal pitch dimension of gears.

Five features of the line are: Able to repeat within 0.0003 in. of gear tooth P.D.; engineered for particular application, whether spindle mounted, face plate, between centers, or inspection gages; increased production because two parts can be mounted on one arbor; designed to be manually or draw-bar operated; smallest size is 0.500 P.D. *Splinemaster Products Div., Great Lakes Branch, Inc.*

Circle 46 on page 81 for more data





*National Broach air powered broaching fixture.*

### **Air Powered Broaching Fixture**

A versatile air-powered broaching fixture designed to cut broaching equipment costs and speed delivery has been placed on the market. The horizontal, self contained fixture will broach holes, keyways and contours on a wide variety of production parts.

The fixture consists of a cast iron base with two integral vertical flanges. A five in. diam air-hydraulic cylinder having a 25 in. stroke is mounted on a flange at one end of the base. The other flange in the middle of the base supports the work rest plate. Two hardened and ground steel guide bars supported by the two flanges guide an automatic broach puller mounted on the end of the air cylinder rod.

Linear ball bushings are provided

in the puller head guide holes to promote long wear life and reduce friction loads. A four-way valve mounted at the cylinder end of the fixture controls the air cylinder travel through the action of three manually controlled pilot valves located at the right of the fixture plate.

In operation, a part is placed on the work rest plate and the broach inserted through the part into the puller. Then two pilot valves (No. 1 and No. 2) are simultaneously depressed, causing the air cylinder to pull the broach through the part. After the part is removed from the rest plate, two pilot valves (No. 1 and No. 3) are depressed, causing the air cylinder to return the broach through the fixture and release it

for removal before beginning the broaching cycle again.

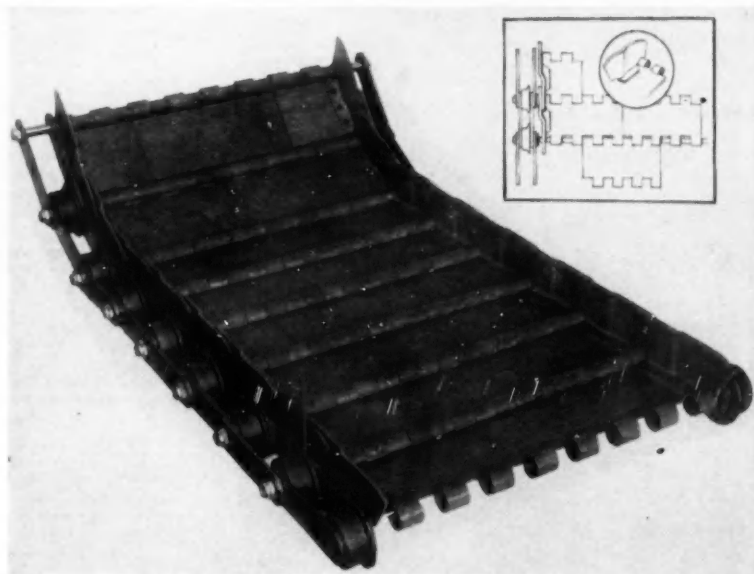
Cycle time to rough and finish close tolerance, highly finished valve spool hole broach in the tractor part shown in the illustration is 15 sec.

The broaching fixture has a 1400-lb broach pull capacity with an 80-psi air line pressure. Rate of broach travel is adjustable through a control valve in the hydraulic end of the cylinder. The broach centerline is 3½ in. above the work surface at the rear of the rest plate.

The fixture is 89 in. long overall, 12 in. wide and 10 in. high. It weighs approximately 600 lbs. *National Broach & Machine Co.*

Circle 47 on page 81 for more data

### **Hinged Steel Belt Link Conveyor**



*Example of the latest type hinged steel belt link put out by May-Fran.*

It has been announced that standard component links of hinged steel belt have been redesigned to incorporate four interlocking flanges on each side of the link. This arrangement is claimed to provide a greater distribution of stress on the belt and also allows links to be staggered. In addition, the increased precision in the positioning of links is said to provide a slightly increased carrying capacity. As before, all links can be furnished solid or with perforations which permit the drainage of coolants and other solutions.

These links are made from heavy-gage steel plate and fastened by means of high-carbon steel rods. The side chains are an integral part of the conveyor belting. *May-Fran Engineering, Inc.*

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**NEW**

**EQUIPMENT**

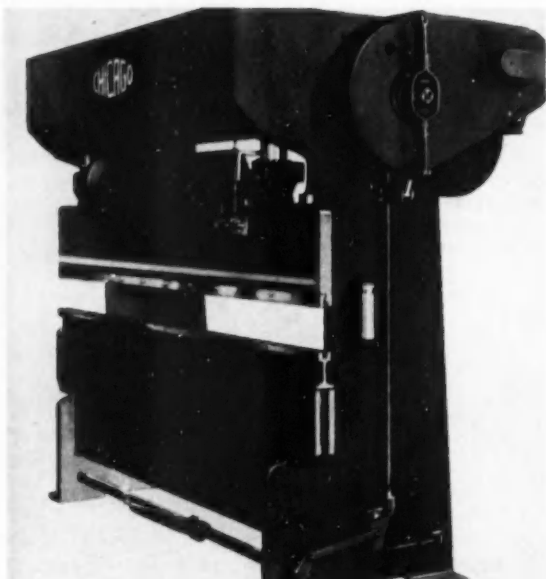
**PLANT • PRODUCTION**



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(Continued from page 75)

## Press Brake for Light-Duty Work



Chicago press brake.  
Series A.

Now on the market is a light-duty press brake, known as Series A, for bending and forming sheet metal and steel plate.

Because of a variable speed drive and other features for a machine of its capacity and size, this Chicago Series A press brake is said to offer increased production on a variety of sheet metal work. A twin-plate bed is claimed to provide extreme lateral rigidity, minimum deflection, and a 1 1/4 in. slug clearance on multiple punching. The variable speed drive (infinitely variable between 20 to 50 strokes per minute) permits the selection of the speed to suit the nature of the work and the skill and speed of the operator.

Even application of the power over the length of the ram is obtained on this brake by a twin drive through a double back gear. A heavy-duty friction clutch and band brake permit jogging and slipping to meet operating conditions. Motorized ram ad-

justment facilitates ram adjustment. This adjustment can be split so that one end can be raised or lowered to tilt the ram for tapered work. Many optional features are available to meet particular requirements.

The machine is available in three sizes with capacities of 54 in. by 10 gage to 120 in. by 16 gage. Each size has a three in. stroke, three in. ram adjustment, 12 in. die space, and the variable speed drive giving 20 to 50 strokes per minute. *Dreis & Krump Mfg. Co.*

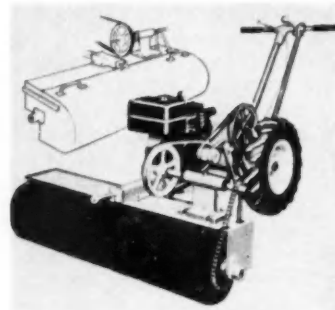
Circle 49 on page 81 for more data

## Power Sweeper

Recently introduced is a motorized power sweeper. It is designed for use on large pavement and floor areas, such as industrial plants.

The unit comes with a hopper that snaps on the front of the brush. It has a handle on each side for carrying. *Eshelman Co.*

Circle 50 on page 81 for more data



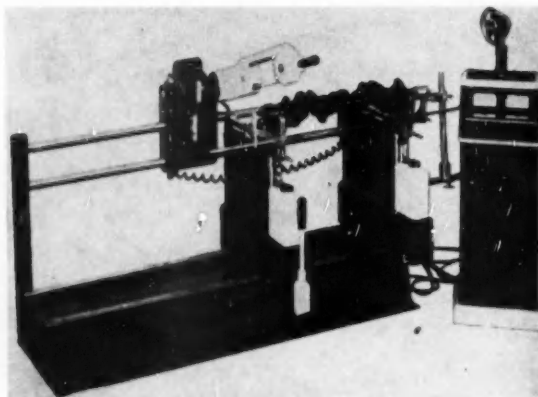
Eshelman power sweeper.

## Industrial Balancer

Quick set up is claimed to make the Stewart-Warner industrial balancer excellent for the testing or experimental laboratory. Precision sensitivity is claimed possible at all weights of items checked or balanced from the range of 1/2 lb to 1000 lb. By turning a knob, five dash pot positions allow balancing a different sensitivity from complete damping to 0.04 oz in.

Set up to various lengths is done by walking mechanism operated by handle on movable stanchion.

Length range is 4 1/2 in. to 55 in. between bearing surfaces. Diametral capacity is 1 1/4 in. to 44 in. *Merrill Engineering Laboratories.*



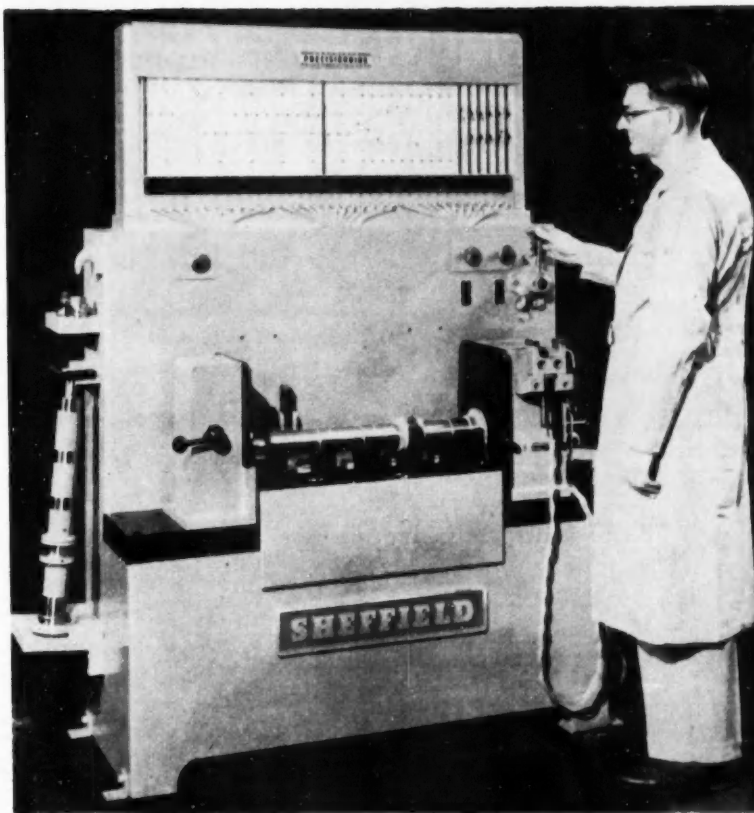
Circle 51 on page 81 for more data

## Multiple Air Gauge Checks 43 Crankshaft Dimensions

Forty-three dimensions on an automobile crankshaft are accurately gaged at one time with the use of a recently engineered Precisionaire crankshaft gaging machine.

With this unique machine, an operator can analyze the most critical dimensions on a crankshaft and tell which are acceptable, oversize, or undersize by viewing the float positions in the 36 column Precisionaire. The "Airechart" or float graph across the face of the glass columns presents a chart that shows whether each dimension is within tolerances.

The gage is used to check the following dimensions and conditions: Five main bearing diameters at three places each, for taper, hourglass, out-of-round, and size; total indicator runout of Nos. 2, 3, and 4 main bearings with the end main bearings; pulley fit diameter; thrust bearing width; oil seal diameter; total indicated runout of the thrust face; flywheel pilot diameter; concentricity of the flywheel pilot diameter; pilot hole diameter; concentricity of the pilot hole diameter; total indicated runout of the flange face; stroke radius of each of the four pin throws; location of keyway to No. 1 pin bearing; diameter of the six counterweight radii; dimension of the thrust face to oil seal location, and the diameter in three places and high fillet of the four crank pin bearings.

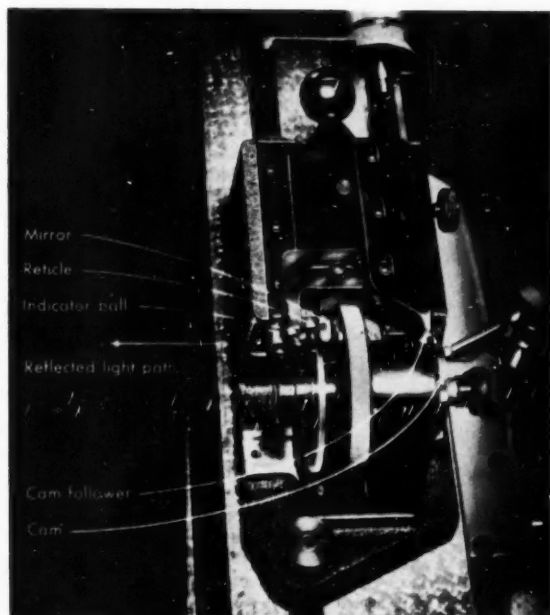


Sheffield multiple gaging machine for crankshafts.

The "airdraulic" lowering and raising of the crankshaft into and out of gaging position protects the gaging

elements from accidental shocks and jars. The Sheffield Corp.

Circle 52 on page 81 for more data



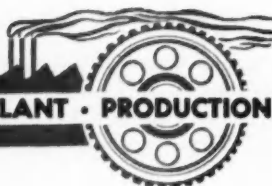
Top view of optical cam gaging fixture made by Optical Products.

## Optical Gaging of Cams

Using the intense light of the surface illuminator of the Kodak contour projector, a recently developed optical gaging method permits inspection of cams mounted as they will be held in assembly. The cam is mounted on an arbor which may be turned by hand. Turning the cam actuates a follower which carries with it an indicator ball. How closely that indicator ball follows tolerance lines, also rotating with the cam, may be readily watched on the projector screen at a large magnification.

The cam to be checked is mounted on an arbor of the staging fixture. An adjustable Y-type yoke carries two followers. One is a precision hardened steel ball which is spring-loaded to follow the contour of the cam itself. The other is a flattened

(Turn to next page, please)

**NEW****EQUIPMENT****PLANT • PRODUCTION**

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(Continued from Page 77)

circular indicator. This duplicates the motion of the follower on the cam contour. The cam to be checked is mounted on an axis common with a glass reticle. The cam is on the operator's end of the axis. The tolerance-carrying reticle is mounted on the projector end of that axis. Motion

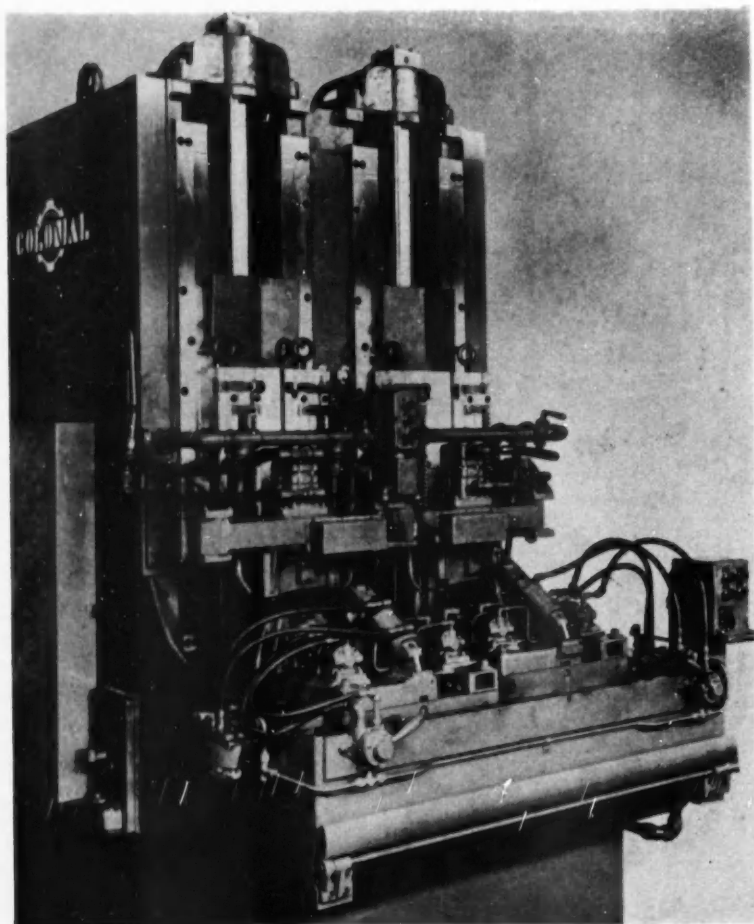
of the reticle throughout inspection procedure is identical to the motion of the cam. Tolerance and contour revision may be incorporated in replacement reticles. *Optical Gaging Products, Inc.*

Circle 53 on page 81 for more data

### Semi-Automatic Broach for Brake Shoes

As a means of reducing loading and unloading time to a minimum,

and thereby speeding up the broaching operation on automotive brake



Colonial broach for brake shoes.

shoes, pneumatic positioning and hydraulic clamping are combined on the shuttle fixtures of a broaching machine. The machine is a standard dual ram 10-ton, 54-in. stroke, with specially designed shuttle fixtures. Insert type broaches cut a slot at one end and a concave at the other at a rate of 400 brake shoes per hour.

Single manual control of three pneumatic cylinders enables the brake shoe to be positioned against three stops by means of the control lever.

Hydraulic clamping, with a single cylinder actuating a saddle clamp, is an integral part of the automatic broaching cycle. Since there are two shuttle fixtures, one can be loaded and unloaded while the other is going through the broaching cycle. *Colonial Broach Co.*

Circle 54 on page 81 for more data

### Automatic Turret Drill Has Six Spindles

Added to a line of production machines is the Model 2BH, six-spindle automatic turret drill. The major feature is the infinitely variable hydraulic feed which can be manually controlled for automatic operations.

Besides incorporating all of the engineering designs of the Burgmaster Model 2A, additional features listed below have been added to further efficiency and increased production with the Model 2BH.

- (1) Infinitely variable feeds.
- (2) 12 pre-selective spindle speeds are available for each spindle.
- (3) Precision double ball bearing spindles.
- (4) 19 in. table travel with large work table.
- (5) Positive depth stops—pre-selective to each spindle.
- (6) Traverse away from work for tapping, rapid traverse to starting, when tapping is not performed—the cycle will be rapid traverse to predetermined point, feed to depth, rapid traverse away from work.
- (7) Skip indexing. Machine can be set to past idle spindle.

Floor space required is 60 in. by 51 in. by 78 in. high. Approximate weight is 2500 lb. *Burg Tool Mfg. Co.*

Circle 55 on page 81 for more data



# NEW

# PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

## Passenger Car Power Brake for Field Installation

Now available as an after-market item is a passenger car power brake, known as the Hydrovac, for field installation. It is said to offer ease, safety and positive braking control and to be adaptable to virtually all popular passenger cars having hydraulic brakes.

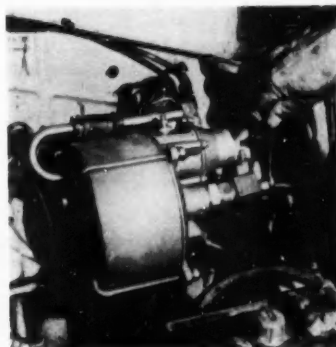
The power brake replacement unit consists of a Hydrovac and a complete fittings kit. The Hydrovac is a self-contained, sealed power braking unit with no external moving parts. It is

reportedly trouble-free and requires no service or maintenance.

The fittings kit contains all the necessary tubing, hose, bracket and connections. Complete instructions for a step-by-step installation procedure are included with each kit. No special tools or skills are required.

Eleven fittings kits cover all the cars in which the replacement power brake can be installed. *Bendix Products Div., Bendix Aviation Corp.*

Circle 28 on page 81 for more data



## Hydraulic-Powered Tailgate for Trucks

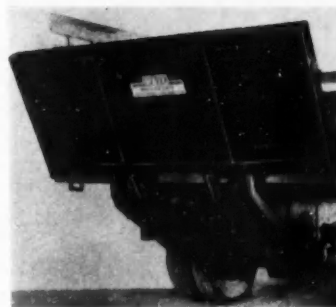
Recently introduced is a hydraulic-powered, elevating truck tailgate. The unit reportedly can be mounted on any truck and can lift a maximum 2000-lb payload.

New operating and safety features incorporated into the tailgate are said to enable one man to handle heavy or bulky objects with complete safety and without strain. Two platforms are available for the unit—a

ramp type and a square-edge type.

The hydraulic mechanism is mounted to clear the axle housing with no loss of ground clearance. A power take-off on the truck mechanism provides the hydraulic pump with power. The tailgate can be opened and lowered manually without starting the truck engine, according to the maker. *The Heil Co.*

Circle 29 on page 81 for more data

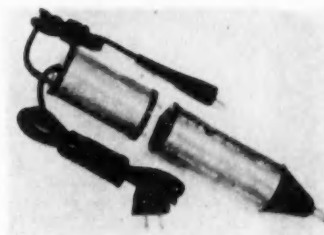


## Electronic Power Supply for Circuit Analyzers

Recently announced is Model PS-1 electronic power supply for use with the maker's models E-C or E-A circuit analyzers. The unit is said to provide both a-c and d-c test voltages to permit a wide range of resistance and continuity tests and to increase the sensitivity of the above models.

The product has a miniature selenium rectifier and dual capacitor rc filter network in a special circuit for testing of condensers for leakage with actual d-c voltages and quick indication of intermittent open condensers with a-c. *Lee Electronic Labs, Inc.*

Circle 30 on page 81 for more data



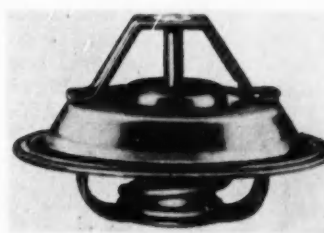
## Car Thermostat for Pressurized Cooling Systems

Recently introduced is an automobile thermostat for pressurized cooling systems. The manufacturer claims that it decreases the amount of warm-up time required and is the first of its kind to use the poppet valve.

The valve is controlled by a thermal actuating unit containing a gelatinous

mineral which expands with heat. This expansion is transferred to the valve by a plunger pin which forces the valve open against a spring. These features assure better operation. *Standard-Thomson Corp.*

Circle 31 on page 81 for more data  
(Turn to page 80, please)



# NEW PRODUCTS.

For additional information please use postage-free reply card on page 81

(Continued from page 79)

## Time Delay Relays

For control circuits requiring two time delay steps, or momentary impulses, four new time delay relays have been announced. The units, known as NET Agastats, have an adjustable auxiliary switch, thus providing two timing steps. Overall time delay is said to be adjustable from 0.1 sec to 10 min or more. Auxiliary switch can be adjusted to operate at any time from 0 to 15 sec after the start of the overall time delay period.



AGA time delay relays.

The time delay of the first two units, called NET-11 and NET-12, starts immediately on energization of the solenoid. After an adjustable interval, the auxiliary switch operates. At the end of the adjustable overall time delay period, the relay switch operates. Both switches hold until the coil is deenergized. Then they immediately return to their normal positions.

When the coil of the NET-21 or NET-22 is energized, both switches immediately operate. Time delay starts

when the coil is deenergized. After an adjustable period, the auxiliary switch returns to normal. At the end of the adjustable overall delay period, the relay switch returns to normal.

NET-11 and NET-12 are spdt, double-break switches. NET-21 and NET-22 are dpdt, single-break. Relay switch rating is 15 amp at 115 v. Auxiliary switch rating is 10 amp at 115 v. AGA Div., Elastic Stop Nut Corp. of America.

Circle 32 on page 81 for more data

## Paint Bonders

Recently introduced is a line of chemical specialties for phosphatizing metals to obtain corrosion resistance and for paint bonding.

The Fosbond line, as it is called, includes a virtually complete range of phosphating compounds for application of various types of iron phosphate, zinc phosphate or manganese phosphate coatings. In addition, the manufacturer has developed a complete line of compounds for surface preparation prior to phosphating.

In one series of these products, the cleaning and phosphating actions are combined, thus eliminating one step in the cycle. Other cycles reportedly have been arranged to provide coatings of minimum weight, yet uniform and very fine grained. Such coatings are said to give the metal thorough corrosion resistance and paint bonding action and to make possible very smooth finished painted surfaces. Pennsylvania Salt Manufacturing Co.

Circle 33 on page 81 for more data

## Aluminum Paint

Now on the market is an aluminum paint for exterior use. Called Thermalite, it is designed for use on metal surfaces with temperatures ranging from 400 to 1000 F.

The paint is said to "fuse" to the surface and will not discolor, blister, flake, or burn off. Tropical Paint & Oil Co.

Circle 34 on page 81 for more data

## Hose Clamps

Now on the market is a line of one-piece hose clamps known as Hoz-Fasteners. They are said to insure a perfect seal between hose and hose connection, in spite of hose shrinkage, expansion, or contraction.



Eaton hose clamps.

The one-piece design reportedly permits ease of application to normally situated hose connections or hard-to-reach places. The constant spring tension of the units eliminates manual adjustment or re-tightening.

The rounded surfaces of the clamps do not cut into any type of hose material, according to the maker. Reliance Div., Eaton Manufacturing Co.

Circle 35 on page 81 for more data

## Starter Relay

Now in production is the K-W automatic starter relay for passenger cars with a re-start feature. If the engine stalls any time while driving, the relay re-starts it immediately, according to the manufacturer.

The unit is also said to be designed to provide automatic starter action immediately upon turning the car key to an "on" position. Stan-Test Corp.

Circle 36 on page 81 for more data

(Turn to page 155, please)



Stan-Test starter relay.

# Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

## FREE LITERATURE

### Metal Cutting Alloy

Catalog VR-451 introduces Tantung 144 to the metal cutting tool field. It is an alloy with greater hardness for use where resistance to abrasion in cutting is important. Data on Tantung G, an alloy for most general purpose metal machining, is also included. *Vascoloy-Ramet Corp.*

Circle 1 on postcard for free copy

### Cold-Working Process

Recently released is a brochure describing the FOS process for locking a phosphate coating and lubricant firmly onto a steel surface. It is said to make cold extrusion practical and cold-working more profitable. *Pennsylvania Salt Manufacturing Co.*

Circle 2 on postcard for free copy

### Stainless Steels

Handbook D-3 is devoted to the selection, working data, and uses of Almet stainless steels for wire, rod, and strip applications. *Alloy Metal Wire Co., Inc.*

Circle 3 on postcard for free copy

### Steel Tubing

Now available is a booklet on Fusionweld steel tubing in sizes 3/16 in. OD to 1/2 in. OD by 0.020 in. to 0.042 in. wall thickness. *Avon Tube Div., Higbie Manufacturing Co.*

Circle 4 on postcard for free copy

### Die Stock Material

Now available is a brochure describing a laminated, compressed die stock material. It is machined with woodworking tools without cutting lubricants and can readily be sawed, planed, turned, drilled, and tapped. *Hy-Du-Lignum Div., U S Bobbin & Shuttle Co.*

Circle 5 on postcard for free copy

### Worm Gearing

Recently announced is a brochure on how maximum results and long service life may be obtained from worm gearing in a wide variety of applications. A line of worm gear drives and speed reducers is covered. *The Cleveland Worm & Gear Co.*

Circle 6 on postcard for free copy

### Fuel Water Remover

Recently released is a folder on the FCS1132-PL combination water separator and fuel filter unit for removing water from Diesel fuel. *Fram Corp.*

Circle 7 on postcard for free copy

### Fibre Products

Catalog GF-54 describes a line of fibre products and their uses. It also contains detailed technical data in tabular form for quick reference. *Continental-Diamond Fibres Co.*

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(Please turn page)

Fill in below for more information on other products featured in advertisements of this issue.

10/15/63

PRODUCTS

PAGE

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PRODUCTS

10/15/83

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THIS POSTCARD VOID AFTER DEC. 15, 1983

Fill in below for more information on other products featured in advertisements of this issue.

## Dust-Fume Eliminators

Bulletin VU-8-53 covers two Centri-Merge vertical rotor wet-type dust and fume eliminators. One is for wet collection and elimination only, while the other is a combination primary dry and secondary wet collection and elimination unit. Capacities range from 500 to 50,000 cfm. *Schmieg Industries, Inc.*

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## Lubricants

Bulletin No. 100 contains detailed data on Molykote lubricants in standard industrial grades and compositions. Basic ingredient is molybdenum disulfide. *The Alpha Corp.*

Circle 10 on postcard for free copy

## Milling Cutter

Recently released is a folder describing the Hi-Helix contour milling cutter. *Douglas Tool Co.*

Circle 11 on postcard for free copy

## Metal Coating

Bulletin GL-1 covers a line of materials, processes, and equipment for metal finishing operations. *United Chromium, Inc.*

Circle 12 on postcard for free copy

## Cylindrical Grinding

Fresh off the press is the second printing of an 84-page publication on basic grinding facts. *Landis Tool Co.*

Circle 13 on postcard for free copy

USE THIS POSTCARD

## Chilling Equipment

Bulletin No. 102 covers a line of industrial chilling equipment for shrinking, testing, and treating of metals. *Sub-Zero Products Co.*

Circle 14 on postcard for free copy

## British Aviation

Issue No. 50 of "The Flying A" is a special British one and features that nation's aircraft activities. *Aeroquip Corp.*

Circle 15 on postcard for free copy

## Industrial Telescope

Ready for distribution is a folder describing the Borescope industrial telescope with a precision optical system for the close-up visual inspection of internal surfaces and hidden parts. *American Cystoscope Makers, Inc.*

Circle 16 on postcard for free copy

## Polisher

Ready for distribution is a brochure on Micro-Polish units for polishing coils, blanks, and sheets of steel, brass, aluminum, rubber, etc. *Murray-Way Corp.*

Circle 17 on postcard for free copy

## Boring Machine Use

Vol. 28, No. 8, 9 of "Tool Tips" has an article demonstrating how a standard double-end boring machine was equipped with a heavy indexing fixture for single-end operation. *Es-Cell-O Corp.*

Circle 18 on postcard for free copy

## Torch Tips

Now available is a brochure on a line of oxy-acetylene cutting and welding torch tips. *National Torch Tip Co.*

Circle 19 on postcard for free copy

## Machinery Facilities

Recently published is a 12-page booklet on the manufacturer's services and facilities for designing, and building machinery and tooling. *Ace-Central States Machine Tool Co.*

Circle 20 on postcard for free copy

## Speed Reducers

Now available is a 15-page booklet (B-5646) describing a line of speed reducers. Features of the equipment, manufacturing techniques, and applications are discussed. *Westinghouse Electric Corp.*

Circle 21 on postcard for free copy

## Small Ball Bearings

Fresh off the press is a 20-page bearing catalog containing design and application data on a line of ball bearings. They range from 0.100 in. OD to 0.375 in. OD in size. *Miniature Precision Bearings, Inc.*

Circle 22 on postcard for free copy

(See preceding page)



# CONTINENTAL'S PROOF BOOK



**H. L. FRIEDAUF, JR.**  
He has been with the Pyrene organization for 23 years; member of the National Association of Purchasing Agents; President for 4 years of the Furnace Brook Club, Greenwood Lake, N. Y.



July 30, 1953

Continental Screw Company  
New Bedford, Massachusetts

Gentlemen:

Like most companies we are interested in the things that save us time and money.

In this respect the supplying of HOLTITE taped screws has saved considerable, both in labor and the cost of the envelopes in which they were placed. These are provided for the wall brackets which are packed with our fire extinguishers.

In addition the printing of our Pyrene trade mark on each tape of screws, whether two or more, is an advertising advantage.

We are pleased with the efficient manner in which you have handled our orders and thank you for bringing this improved way of supplying screws to our attention.

Cordially yours,

**Pyrene Manufacturing Company**  
*H. L. Friedauf, Jr.*  
Purchasing Agent

H. L. FRIEDAUF/jr

*You too can count on Continental.*



**Manufacturers of HOLTITE Fastenings For Every Purpose**

CONTINENTAL SCREW COMPANY, NEW BEDFORD, MASS., U.S.A.

# N



## AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

### Snap-Type Fastener for Holding Fuel Cells in Place

Now on the market is a snap-type fastener for holding airplane fuel cells in place without piercing the cell wall on installation.

The device consists of three major components: a stud sub-assembly, or "male" part, which is fitted to the outer wall of the fuel cell; an alumi-

num washer that acts as a bearing surface for the stud sub-assembly; and a housing sub-assembly, or receptacle, which may be riveted or screwed to any surface or structural member to which a part must be fastened.

The unit is available with either of two standard housing sub-assem-

blies: a horizontal model (No. 49101) or a vertical model (No. 49001).

Housing sub-assemblies with lighter insertion pressure are available for applications in which accessibility to the assembly is a problem. *Waldes Kohinoor, Inc.*

Circle 25 on page 81 for more data

### Rate Integrating Detector for Control Systems

Recently introduced is a rate integrating detector for use in automatic control systems. Known as Model 97, the unit is said to be tumble-free in operation, thus giving consistent single axis control of an air vehicle (guided missile or aircraft) during any flight maneuver.

A further advantage of the detector is reported to be the absence of vacuum tubes and magnetic amplifiers. Besides its automatic control system application, Model 97 is well suited for telemetering use, according to the maker.

The detector consists of a rate gyro and an integrating motor. These units are coupled within a case weighing three lb. The unit is hermetically

sealed and contains a corrosion-resisting inert gas.

The detector operates through the transfer of rate gyro signals to the integrating motor. The motor, in turn, integrates the signals in such a way as to post the aircraft autopilot on angles of variation in position or space. A direct electrical signal will change the reference angle.

Both components of Model 97 are provided with precision wound potentiometers. The rate gyro may be provided with either a d-c, a 400-c, or an 800 cycle-per-second motor. Rotor speeds of this motor vary from 10,500 to 48,000 rpm, depending on the power source. *Summers Gyroscope Co.*

Circle 26 on page 81 for more data



Hydro-Aire fuel booster pump.

### Fuel Booster Pump

Now on the market is a fuel booster pump that handles high vapor-liquid ratios with the reputed ability to recover after an electric power failure at altitudes as high as 70,000 ft. Prime feature is a new type pump impeller so designed that it depresses the vapor formed back into liquid.

In actual operation, it is claimed that the unit has performed satisfactorily with both aviation gasoline and jet fuels while following climb rates far in excess of known requirements.

In all operations, boiling fuel and accompanying vapor enters the pump and leaves as a solid liquid, the maker states. *Hydro-Aire, Inc.*

Circle 27 on page 81 for more data



Summers rate integrating detector

# Need low cost, long life, good oil retention?

*here's how manufacturers of textile machinery*  
*assure them with* **NEEDLE BEARINGS**

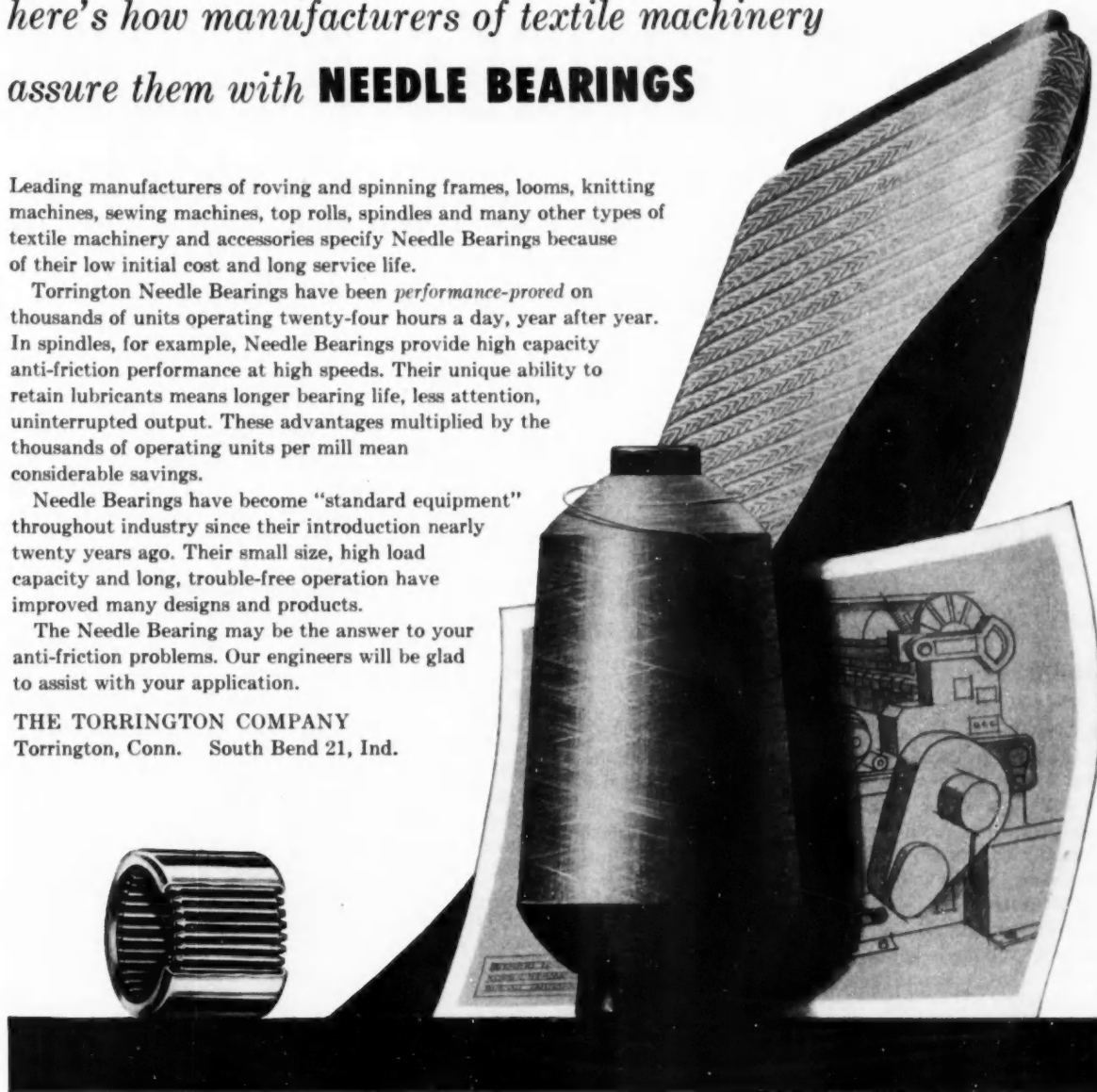
Leading manufacturers of roving and spinning frames, looms, knitting machines, sewing machines, top rolls, spindles and many other types of textile machinery and accessories specify Needle Bearings because of their low initial cost and long service life.

Torrington Needle Bearings have been *performance-proved* on thousands of units operating twenty-four hours a day, year after year. In spindles, for example, Needle Bearings provide high capacity anti-friction performance at high speeds. Their unique ability to retain lubricants means longer bearing life, less attention, uninterrupted output. These advantages multiplied by the thousands of operating units per mill mean considerable savings.

Needle Bearings have become "standard equipment" throughout industry since their introduction nearly twenty years ago. Their small size, high load capacity and long, trouble-free operation have improved many designs and products.

The Needle Bearing may be the answer to your anti-friction problems. Our engineers will be glad to assist with your application.

THE TORRINGTON COMPANY  
Torrington, Conn. South Bend 21, Ind.



## TORRINGTON *NEEDLE* BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

Trade-marks of leading textile machinery manufacturers who use Torrington Needle Bearings.

 WARNER & SWASEY TEXTILE MACHINERY DIVISION	 GKN ROBEY & CO. LTD. SHEFFIELD, ENGLAND	 CIRCULAR JACQUARD	 D	 S	 RR	 BARBER COLMAN
<i>Union Special</i>		KARL LIEBERKNECHT, INC.		<i>Whitin</i>		

# The BUSINESS PULSE

*Analysis of Business Indicators Reveals Favorable Trends. Discount Performance of Stock Market As Accurate Forecaster of Changes. Tax Reductions Expected to Have Counterbalancing Influence Next Year.*

This Survey Is Prepared  
Exclusively for AUTOMOTIVE  
INDUSTRIES by the Guaranty  
Trust Company of New York

## Business on High Level

Thus far in the post-Labor Day period business has continued on a high plateau, with volume holding close to the peak levels attained in the earlier months of the year. A few indicators suggest that the autumn rise in activity may be lagging somewhat behind that in 1952 and other recent years, but the margin of difference hardly appears pronounced as yet. With employment and income at peak rates, business seems pretty confident that the boom is not going to run out of steam overnight. Rather, the feeling seems to be that business volume is going to continue at generally favorable—that is, comfortably profitable—levels at least through the end of this year.

With respect to the period beyond the final quarter of this year, there is no comparable consensus. That some sort of downward "adjustment" is in the offing seems to be widely accepted, but there appears to be considerable uncertainty as to the probable magnitude of any decline, despite confident statements by Government leaders that nothing of a serious nature is likely. The fact is that the future is always uncertain and the possibility of a substantial downturn—at least for some industries—cannot logically be excluded from the speculation. Hence the overhanging uneasiness.

The rather persistent downward tendency of stock prices during recent months and the rather sharp break in such prices in the early part of September clearly reflected the prevailing uncertainty. While no single factor appears to have been causal in the downward movement, it is probably no coincidence that the weakness in stock prices has occurred at a time when

considerable publicity was being given to the Administration's economy drive. Apprehension over the possible impact of reduced Government outlay may well have been the dominant consideration. Concern over the decline in the steel industry's operating rate was probably also a factor.

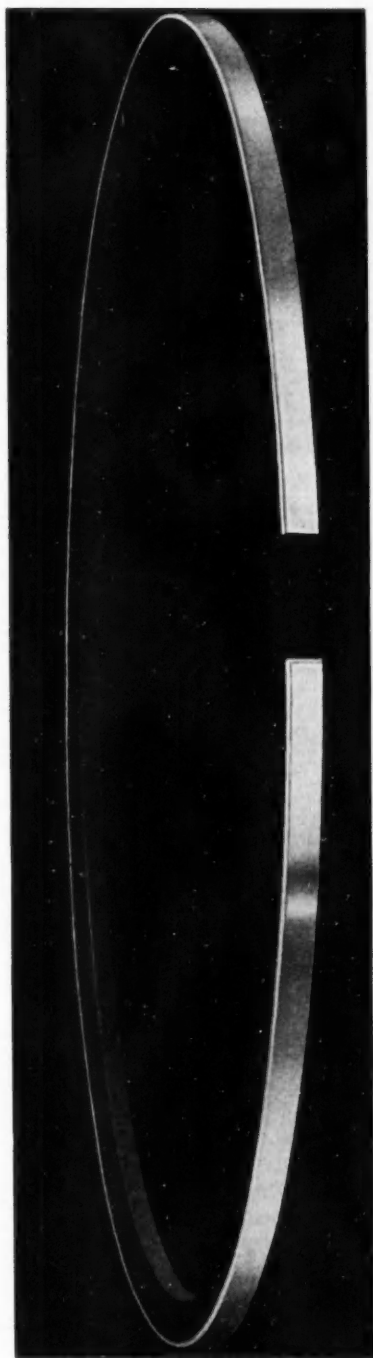
## Stock Market Divergence

Considerable attention has been given to stock-market weakness, and not infrequently it has been asserted that the stock-market decline, which over the past nine months has been rather substantial, is a harbinger of next year's economic developments. However, past experience suggests that it would be a mistake to accept the performance of security markets as a necessarily accurate forecaster of changes in the level of business activity. Not only have the stock market and business activity moved divergently in the relatively recent past (e.g., 1939-42 and 1946-48), but even in those instances when the stock market has correctly anticipated the *direction* of a change in business volume, it has frequently given an erroneous impression as to the *magnitude* of that change. In other words, there is clearly no one-to-one correlation, so that it would be foolish indeed to become greatly disturbed over next year's business prospects solely because of what the stock market has done recently or may do tomorrow.

Various Administration officials have expressed concern over the prevalence of "recession talk," some indicating that in their view the stock-market decline was out of line with actual business prospects. Secretary Humphrey, by way of counterbalancing influence, has given renewed assurance that the so-called excess-profits tax will be permitted to expire next January 1 and that the scheduled 10 per cent reduction in individual income taxes will also become effective on that date. Moreover, in discussing the declining tendency of Government outlay, he has emphasized that the immediate reduction will not be abrupt, so that "there will still be a tremendous amount of money to be currently pumped into the economy." Finally, as

*(Turn to page 148, please)*





Chrome-Faced Cyclan Ring

# More about Cyclan

Sealed Power's amazing new  
piston ring material

## *What Cyclan is...*

Cyclan is a high-strength, heat-treated alloy iron with strength approaching that of steel, and with resilience and life-expectancy far exceeding cast iron. Cyclan has the ability to retain its physical properties under extreme operating heat. Its bearing characteristics resemble those of cast iron. Cyclan was developed by Sealed Power.

## *What Cyclan does...*

Cyclan stands up where engines are subjected to extreme operating conditions, pulling heavy loads over rugged terrain. Cyclan piston rings will not break in super-charged engines. Their gaps will not change under extreme heat. Cyclan metal is not affected by temperatures 50% higher than those at which standard piston rings irons fail. Cyclan possesses extraordinarily high impact value for shock resistance and can undergo considerable distortion without sacrificing resilience.

Cyclan is available for original equipment piston rings in heavy duty engines. Some Sealed Power Cyclan Piston Ring sets are available for replacement now. Others will follow soon.

Let our engineers tell you the Cyclan story!

# Sealed Power Piston Rings

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts. Leading Producer of Automatic Transmission Rings, Power Steering Rings and Non-Spin Oil Rings.

# AIR BRIEFS

By **ROBERT McLARREN**

## Military Procurement Puzzle

Aircraft industry leaders are already a little dizzy from the wild gyrations of the Air Force in the past few weeks. After working for some three years on a continually-expanding program of aircraft procurement, the industry was served notice that things were going to be different last August, when Defense Secretary Wilson announced a current program for only 120 wings, instead of the long-established goal of 143 wings. The Air Force took a \$5 billion reduction in its current (fiscal '54) budget, but Wilson insisted that production would continue towards an eventual 143-wing Air Force. But the cuts were not long in coming. Last month the Air Force announced a slash of 965 planes, worth about \$750 million, from the current program. Late in the month a cut of somewhere between 2000 and 6000 aircraft engines worth about \$500 million was announced. Yet, simultaneously, Secretary Wilson and President Eisenhower were publicly stating that our strength in the air was growing daily and that we must never lose mastery of the skies!

Despite the fact that the industry has long pleaded for five-year procurement programs, it now appears that many procurement programs had grown stale in the process of continuing delays. The new procurement leaders have mowed these back and appear to be strongly embracing the newer and more advanced types. The Air Force, under Wilson's prodding, has heavily increased its production plans for the North American F-100 "Super Sabre" fighter, which regularly flies at supersonic speed in level flight. A second source has been established for the monster Boeing B-52 Stratofortress and it will now be built at both the Seattle, Wash., and Wichita, Kans., plants of the Boeing Airplane Co.

On order, too, are such advanced new fighters as the Convair F-102 "automatic" interceptor, the McDonnell F-101 long-range jet fighter and the new Republic F-105 ground support type. While reductions in the number of airplanes to be built hardly support Wilson's theme that day-by-day we are growing stronger and stronger, if these cuts result in the substitution of more advanced aircraft, the ultimate value of these currently-unpopular decisions will prove a blessing.

## New Speed Records Spiraling

The world's speed record has been spiraling at a dizzy pace the past few weeks as new marks are established in such profusion as to prohibit their official recognition by the Federation Aeronautique Internationale (F.A.I.), the world's governing body for performance records. At the moment the record stands at 698.5 mph set last November by Capt. Slade Nash in a North American F-86D fighter. On July 16 of this year this mark was raised to 715.7 mph by Lieut. Col. William Barns in the same type airplane, and this figure is now being promulgated by the F.A.I. With America seemingly well out in front of the speed race, we were caught by surprise by the 727.6 mph mark hung up by Neville Duke in the British Hawker Hunter fighter on Sept. 7. This mark was smashed by another Englishman, Mike Lithgow, who flew a Supermarine Swift to a new mark of 737.3 mph on Sept. 26th. But the U. S. moved back into the race on Sept. 29 when the U. S. Navy Douglas XF4D-1 Skyray carrier fighter, flown by Lt. Cmdr. James B. Verdin, hung up a mark of 742.7 mph. Meanwhile, the Air Force has been waiting for the Navy to complete its trial runs of the F4D over the official course along the Salton Sea in the California Desert. Reason: its North American F-100 is ready to set the record up to a near-800 mph, providing a hot day can be made available. Such dizzy figures are now quite beyond the comprehension of the layman—and even the aeronautical experts themselves express amazement at the sudden acceleration of airplane speeds during this 50th Anniversary year.

## Fuel Demand

The demand for aircraft jet fuel will surpass that for aviation gasoline by the end of next year, according to Lieut. Gen. James H. Doolittle (USAF, Ret.), Vice President, Shell Oil Co. This prediction is the first informed assessment of the fuel demands now being made by the thousands of jet aircraft now in military operation in this country and it had not previously been supposed that these aircraft even approached the fuel usage of our scheduled airlines and business airplanes. Doolittle also believes that natural petroleum lubricants have about reached their limit in the jet engine field and that synthetic lubricants must

(Turn to page 137, please)

# *Synchro-Start*

## OVERSPEED GOVERNORS

*For Tachometer Drive Take-off*



This Governor can easily be mounted at any location and driven by a standard S. A. E. Heavy Duty Flexible Shaft connected to the tachometer take-off.

It has a single pole double-throw switch enclosed in the cap for either Automatic re-set (Model GFA) or Manual re-set (Model GFM) with contact capacity of 10A at 125V non-inductive load. The rotating parts run in Sealed Ball Bearings lubricated for life and the entire unit is weather-proof.

These Governors can be mounted in any position and have the same characteristics as our Model GKA or GKM which we have been supplying for the past 20 years.

Speed can be adjusted to 20% over or under the ordered shut down speed while the engine is running. Ask for Bulletin 409-A or our catalog #4 describing our full line of Automatic engine control equipment.

### **SYNCHRO-START PRODUCTS, INC.**

*Automatic Engine Control Equipment*

8151 N. RIDGEWAY AVE. • SKOKIE, ILL.

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 23

## Lift Trucks Needed in Rail-Truck Haul

Manufacturers of large lift trucks can look forward to some sizable business if the rail highway coordination program being sponsored by General Motors achieves general acceptance. The program envisions hauling two semi-trailers per car on trains of special 75-ft rail cars between major cities. One fundamental requirement is rapid loading and unloading of trailers from the side of the cars at special docks. Initial studies show that this can best be done by using a standard lift truck modified for the particular operation.

Ross Carrier Div. of Clark Equipment Co., has done some development work. A standard type lift truck with front wheel drive and rear wheel steering is used but with the forks toed in to join at a point 59 in. in front of the truck bumper. Load capacity also is increased by strengthening tower members and eliminating the normal tilting feature.

Another departure is provision for lateral travel  $4\frac{1}{2}$  in. in either direction. At the junction of the forks a pin is installed to engage a slot in the towing plate of the trailer about 18 in. in front of the kingpin to permit moving the trailer onto the rail car and locating the kingpin into the special stanchion. The lift truck used has a load capacity of 24,000 lb, an eight-in. diameter cylinder, constant volume pump with self-closing hydraulic valve and single lever control, and hoisting speeds of 35 ft per minute.

## Body Engineers Will Hear of Road Race Planning

A highlight of the seventh technical convention of the American Society of Body Engineers will be a paper on preparing for the Mexican Road Race. The first session begins at 10 a.m. Oct. 28 at the Rackham Building, Detroit. Other sessions will include a panel on safety, and papers on European styling, upholstering, cost estimating, plastics for dies, die casting,

## COEN AWARD PRESENTED

Winner of the General Motors Coen Award for participation in the GM Suggestion Plan again is Rochester Products Div. G. H. Mack is shown receiving the award from Harry B. Coen, retired GM vice-president.



plastic bodies, and air conditioning. The meeting runs through Oct. 30.

## AMA Publishes 1953 'Facts and Figures'

AMA has published its 33rd edition of Automobile Facts and Figures containing statistical information about the automotive industries. The 80-page publication contains information on such items as promotion, registration, scrappage, fuel consumption, taxes, imports and exports, vehicle mileage travel, parts and accessories, and many other subjects.

Indicative of the type of information contained in this year's edition

are the following: vehicle travel is now at the rate of more than half a trillion miles a year; about 28 per cent of the vehicles now in use are 11 years old or older; special taxes on motorists last year totaled \$5.3 billion; traffic fatalities per 100 million vehicle miles last year were 7.3, the lowest in history, and since 1900 motor vehicle production in the U. S. has totaled 129 million with 1952 production exceeding that of the rest of the world by about 2 million. Distribution is being made to public groups, with copies available upon request to the Automobile Manufacturers Association, New Center Bldg., Detroit 2. (Turn to page 112, please)

## 1953 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	September 1953	August 1953	September 1952	Nine Months	
	1953	1953	1952	1953	1952
Chrysler.....	4,354	6,304	3,398	125,456	80,965
De Soto.....	5,636	8,697	9,473	100,413	66,577
Dodge.....	16,313	13,976	20,003	233,990	172,317
Plymouth.....	40,266	46,332	52,443	497,529	332,899
Total—Chrysler Group....	66,571	75,309	85,317	957,388	654,778
Ford.....	126,120	123,655	91,712	879,390	516,479
Lincoln.....	287	2,511	4,125	35,156	24,979
Mercury.....	36,432	35,306	15,099	232,966	126,710
Total—Ford Group.....	162,839	161,475	100,936	1,147,522	668,176
Buick.....	40,846	48,356	34,342	412,035	237,110
Cadillac.....	3,964	4,812	9,815	62,647	73,624
Chevrolet.....	128,767	136,564	100,241	1,179,074	826,441
Oldsmobile.....	12,269	24,390	24,536	270,076	167,228
Pontiac.....	26,427	31,086	29,530	330,934	201,398
Total—G. M. Group....	213,333	245,960	199,479	2,274,769	1,305,999
Henry J and Kaiser.....	None	None	6,966	19,804	51,663
Willys.....	3,296	4,082	4,506	37,696	35,633
Total—Kaiser Group....	3,296	4,082	11,572	57,702	87,296
Hudson.....	4,296	3,834	6,740	61,832	60,971
Nash.....	3,960	None	17,543	111,323	96,806
Packard.....	3,228	4,457	5,786	74,779	44,247
Studebaker.....	13,636	22,159	14,277	154,678	111,036
Total—All Makes.....	470,169	517,306	440,647	4,840,193	3,029,409



# ENGINE BUILDERS: CUT THE COST OF chrome plated oil rings IN HALF!

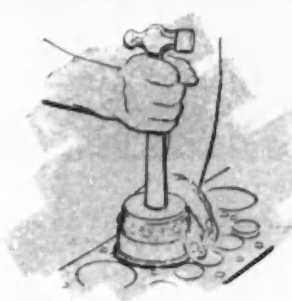
This new Muskegon CHR-270 is a brand new multi-piece ring that combines the advantages of chrome plating and "Unitizing" at a remarkable price—half the cost of chrome plated cast iron oil rings.

By chrome plating the rails, Muskegon brings you a ring that virtually eliminates scuffing, reduces engine repairs, increases oil economy and reduces ring wear, bore wear and friction. And by applying its patented "Unitizing" process, Muskegon delivers the multiple pieces assembled together with special adhesive which dissolves completely during the first engine run, leaving the pieces separated and free to conform to cylinder contours like it in your assembly line like a one-piece ring.

Test these unbreakable, all-steel CHR-270 rings in your own engine, in your own laboratories. See for yourself the extra efficiency, extra economy they provide. Write us, today.



Multiple pieces handle like a one-piece ring. Rails and spacer are correctly assembled and "Unitized" with adhesive cement.



Adhesive disappears during first engine run. Pieces separate to conform to cylinder contours.



Heavy duty expander assures perfect fit. Tight seal conserves oil, increases engine efficiency.

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# Sweden's Underground Aircraft Industry

(Continued from page 57)

Force order for an axial jet engine, Flygmotor worked on the centrifugal type, and engaged Lysholm to carry out this project.

With medium-powered British jet engines readily available for manufacture, it was found desirable to concentrate all efforts on relatively powerful engines.

In 1949 this engine, the STAL

Dovern was run for the first time. It was designed to be fitted into the future series of Saab-32, and the idea was that it should be developed for production by STAL and Flygmotor working together. Last year, however, the Air Force decided that this development contract (which also included a new 11,000-lb thrust jet engine, the STAL Glan) was to be can-

celled, notwithstanding the fact that it had cost the Government \$5 million.

This decision apparently was reached on the ground that the country's resources are not big enough to keep pace with the major nations in such an expensive field as jet development. The Swedish jet engine, although well designed, was still relatively untried. As long as high-class jet engines could be obtained for license-manufacture and at a cost far below that of a domestic product, the project of a Swedish-designed jet engine was no longer considered a matter of urgency.

## International Relationships

Planning for large-scale production of the 32 along with continuing the manufacture of the 29, Saab will require additional production facilities. Total output is today larger than even during the peak of the war period and since 1950 the number of workers has risen by 60 per cent. The company has announced an investment program including increased factory space and equipment at a cost of \$7.6 million.

With the pressing demand of the Air Force, the curtailment of Swedish civilian aircraft production has been inevitable. The major part of this manufacture has been transferred to the Netherlands. Flygmotor again has recently, on the request of the Air Force, decided to restrict drastically the side-line of printing machinery production, the bulk of which during the last few years has been sold on export markets.

The well-known Dutch Fokker Co. is now engaged in manufacturing the Scandia, a 32-40 passenger airliner, developed during the first few post-war years. Furthermore the De Schelde Co. of Dortrecht is producing the very popular Saab-91 B, the Safir, a three-seat trainer-tourer. With this plane Count C. G. von Rosen, the Swedish head of the Imperial Ethiopian Air Force, flew non-stop Stockholm-Addis Ababa (3865 mi) beating the existing world record in this category. The agreements with Dutch companies have resulted in an indirect extension of the capacity of the Swedish aircraft industry. The marketing of this aircraft, however, remains in the hands of the Swedish company.

With its growing experience and output, the Swedish aircraft industry



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When you're up in the clouds over new product development, take time to get the long view on the latest in methods and materials. Make sure you're aware of all that castings have to offer. And to get a real insight into what castings can do . . . there's none better to show the way than Campbell, Wyant and Cannon. A recognized leader in metallurgical engineering, precision control and mechanized production . . . CWC produces castings well known for their longer wearability, their ease of machining and their low cost. Of course, castings by Campbell, Wyant and Cannon also let you design with greater freedom . . . greater flexibility.

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during the last few years has shown its ability in developing export markets for its products. The Scandia airliner has been sold to the Scandinavian Airlines System (SAS) and to Viacao Aerea Sao Paulo S.A. (VASP), which since 1950 has operated these planes in the traffic between Sao Paulo, Rio de Janeiro and Curitiba, and which recently has ordered further series of this type. On the other hand, in addition to being the new standard primary trainer of the Swedish Air Force, the Safr is used by the pilot training school of the Belgian Airline Sabena and other foreign training centers including the Swedish-trained Ethiopian Air Force. There are also indications that Saab intends to sell its 29 jet fighters to foreign countries. If this trend continues, the aircraft industry might possibly reach the same standing as the armament concern of Bofors, which does an important business in supplying both large and small nations with military equipment.

## Radial Forming of Sheet Metal Parts

(Continued from page 49)

collars which can be adjusted. Threaded on steel columns, these collars are raised or lowered by turning wheels which are chain-connected to the columns by integral sprockets. One revolution of the turning wheels results in a change in diameter in the mandrel shoes of 0.025 in. Fractional adjustments of as little as 0.005 in. in diameter can be easily obtained.

With the new, more powerful machine, alloys of stainless steel as well as aluminum may be processed. Aluminum skins can be formed in the SW condition or in the SO condition and heat treated afterwards. The component sections are designed slightly smaller than required so that they can be stretched out to exact dimensions.

It is interesting to note that the big mandrel has a capacity for delivering stresses that approach the effectiveness of large hydro presses. The hydraulic oil which is fed to the mandrel has the highest operating pressure of any fluid in the plant (5000 psi).



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## New Panhard Light Alloy Sedan

(Continued from page 37)

tions. Length is 60 in.; internal width 55 in. The side rails are formed of three longitudinal elements welded together to form a box section. The front cross frame member consists of the sheet steel construction on which the entire power plant is mounted, and it is attached by three bolts on each side. At this point the side rails are considerably stiffened by a triangular reinforcement in two mm Duralinox.

So far as its main features are concerned, the rear mechanical unit is similar to the one used on earlier Panhard models. While the open-V steel tube axle is rigid, it has a central elastic attachment which gives semi-independently sprung wheels. Suspension is by triple transversely-mounted torsion bars. The new feature is the incorporation of a big soft rubber ball between a seven-in. diameter steel disk near the outer ends of the axle and a fixed pressed steel dome. The disk carries a one-in. layer of rubber. Under normal load the two rubber surfaces are just in contact. As the axle rises the rubber is compressed. The object of this is to give a soft, silent, supplementary suspension and to relieve the hydraulic shock absorbers to a certain extent. The rear mechanical unit is attached by five bolts only.

The fuel tank is light alloy, shallow, the full width of the automobile, and is recessed in the floor of the baggage compartment, its base forming a continuation of the unbroken flooring.

As illustrated, the fixed curved windshield is set in a rubber tube which is air inflated with a hypodermic needle, giving a tight seal with both metal and glass.

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# Die Castings for Automotive Components

(Continued from page 41)

because of cost savings in the machining operations which are resultant from close dimensional control in the casting operation.

In addition to the lightness and cost factors, magnesium die casting alloys have a relatively high thermal conductivity and good energy absorption qualities. Some of the castings which have been made must carry a

high static and fatigue load. After one automobile company spent considerable time testing a car with magnesium parts, the conclusion was reached that magnesium and aluminum can be released as optional materials for a particular design. A possible exception would be in the case of a part where deflection is a major consideration.

In the opening portion of this article, it was mentioned that one typical car uses approximately two lb of magnesium die castings. However, parts have been made for production that weigh up to 10 lb.

Magnesium producers are looking toward the same automotive components for their market as the aluminum producers, i.e., automatic transmission, power steering, and power brake parts.

One of the major drawbacks to extremely wide usage at the present time, according to F. H. Mason of Chrysler Corp., is that magnesium is in somewhat short supply. A nominal application of 30 lb per car in a normal productive year would somewhat burden the magnesium industry which has an estimated annual production of 260 to 280 million lb.


Some of the parts which have been actively in production at one major company include a fan spacer, transmission parts, and hardware such as hinges and arms for convertible coupes. This same producer is also considering placing door plate strikers, horn bodies, and shifter lever brackets in production.

Transmission parts are being very seriously considered by many companies engaged in the production of automatic drives. Such parts as the torque converter housing and clutch housings have been made and put to test. Other transmission components either in production or being tested include valve plates, valve bodies, shifter guides, clutch pistons, transmission extensions, and adapter plates.

All of the emphasis, however, is not on the automatic transmissions. Oil pumps, oil filters and parts thereof, fuel pump adapters, oil seals, rocker arm supports, generator and starter end plates, speedometer bezels, and windshield wiper motor end bells are other possible production parts. A great deal of consideration has also been given to some of the larger interior parts such as instrument panel castings or complete instrument panel housings, and steering column hardware. For the steering column, the largest part would be the complete shroud (currently in production for a high-priced car); several smaller parts of magnesium die castings including caps, brackets, collars, flanges,

(Turn to page 101, please)

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WITH A SPECIAL "FINGER-LIFT" device for crate-handling, combined with a side-shifter attachment for their fork trucks, the A. O. Smith Corporation not only reduced labor costs \$108,000 a year—they also eliminated \$18,000 worth of pallets and made available 27 men and 8 trucks for other work!

As usual, CLARK plays a major role in this amazing savings achievement. Admittedly, not everyone can save \$108,000 a year with modern handling equipment; but by the same token, you might save more, depending on the nature of your handling problem. Why not find out what's in it for you? Simply ask your CLARK Dealer to analyze your own particular handling activities. Don't pass up this opportunity for *really big savings!*

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Detailed case history available on request.

This is what the A. O. Smith Corporation accomplished:

- 1** Saved 43,300 man-hours or \$78,000 a year in shipping and warehousing.
- 2** Minimized breakage and damage to crates, saved \$30,240 a year on repair labor.
- 3** Eliminated 4000 double-faced pallets costing \$16,000.
- 4** Accomplished a 30% reduction in required storage area—crates are exactly-positioned in neat rows, two, three and four high.
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## Die Castings

(Continued from page 98)

and selector lever knobs could also be utilized.

One distinct possibility to cut down on passenger car unsprung weight would be the use of die cast magnesium wheels. Door frames have been die cast of aluminum and this is also feasible with magnesium. Window opening and closing mechanisms could advantageously be die cast of magnesium.

Of interest is the fact that the Dow Chemical Co. has recently installed a 1000-ton die casting machine in its Midland plant. This machine is one of the largest in the country in operation today.

Another recent development in magnesium die casting is the increased use of automatic transfer of metal which is possible because of magnesium's lack of affinity for iron.

**ZINC**—By poundage zinc is the most widely used die casting metal in the automotive field; being used for such things as radiator grilles, trim, carburetor bodies, fuel pump bodies, louvers, and radio grilles. Perhaps the most striking component made of die cast zinc was the huge Packard one-piece radiator grille made by Doehler-Jarvis.

Although the zinc in a die casting is more costly than aluminum and magnesium, it sometimes can be finished at less expense for certain trim parts. Zinc die castings can often be turned out at a rate of about 300 to 500 parts per hour, and higher production rates are being obtained on certain thin-walled parts.

Zinc can be die cast economically in comparison with other materials, due to lower finishing costs, when the parts are designed with sharply recessed areas or certain fine ornamental engraving. After trimming, the material requires little polishing and buffing before plating.

For the present, it appears as though zinc will continue to be used for carburetor parts, fuel pump bodies, some radiator grilles, stone shields for fenders, and frontispiece for car radios, decorative trim and ornaments. It does not seem likely that zinc-based die casting alloys will be used extensively for such items as automatic transmission parts, power steering components and power brake applications, since it has low creep strength, is subject to cold flow when excessively loaded and it should not be utilized where constantly heated above 200 F.

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An important new Schmieg development to wash hazardous dust and fumes from the air in a rotating torrent of water, combining the cyclonic principle of dust separation and positive high pressure water action.

Just a few of many reasons why a new Centri-Merge unit is your best investment in operating efficiency and economy:

- Low ratio of power to rated capacity • High ratio of water circulated to air volume handled • Independently driven low speed rotor and fan permit adjustments to load and operating conditions • No slots or nozzles to restrict water action • Automatic liquid level control • Optional location of air inlet arm • Material disposal by drag conveyor, hopper tank skim-off or manual clean-out • Easy access to clean-out doors for cleaning while unit is in operation • Bearings located out of liquid, fully enclosed, lubricated from outside.

**Available in Two Types**

1. For wet collection and elimination only.
2. For primary dry and secondary wet collection and elimination, with built-in dry type pre-cleaner.

Capacities from 500 to 50,000 C.F.M.

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Write or phone for your copy of Bulletin VU 8-53, describing the superior operating characteristics and maintenance advantages of the new Vertical Rotor Units. Then consult with Schmieg engineers to plan a Centri-Merge installation for maximum dust and fume collection and elimination efficiency in your plant.

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D4 Tractor, with ditcher attachment, dredges slough to drain into ditch beside road in Saskatchewan, Canada.



D2 Tractor, with Killefer chisel, renovates Bermuda grass in Arizona orange grove.

# Caterpillar's big yellow machines spotlight Bundyweld wearability

When fire runs through the forest . . . when the river rolls over the levee . . . in thousands of other less dramatic but equally vital situations . . . the big yellow machines from Caterpillar Tractor Co., are on the job. They're dependable. They *do* the job.

The durable Caterpillar Diesel Tractors, particularly, call for many different tubing applications: hydraulic transfer lines, fuel systems, fuel-tank-to-engine lines. Let's look closely at just one of these applications—the long line running from tank to engine, in models like the D2 and D4.

This important connection, main artery of the fueling system, must be absolutely leakproof. It must stand up under vibration, have high tensile strength, high fatigue limit. It must meet all the standards *uniquely* met by Bundyweld Tubing—so, of course, Caterpillar *uses* Bundyweld.

In trying to reduce the choice of Bundyweld to just one factor, Caterpillar engineers say, "wear-

ability." Better than any other tubing, Bundyweld takes punishment day after day . . . year after year.

And Caterpillar engineers and production people like Bundy's fabrication ingenuity. This particular fuel line reaches Caterpillar exactly shaped, for quick, trouble-free installation.

Whether you need fabricated parts or straight lengths of Bundyweld (the *only* tubing double-walled from a single strip and copper-bonded throughout 360° of wall contact), it will pay you to talk over your application with a Bundy Tubing specialist. Call, write, or wire Bundy Tubing Company, the world's largest producer of small-diameter tubing.

Drop in to see us at our exhibit in the National Metal Exposition, in Cleveland, October 19-23.

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## WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



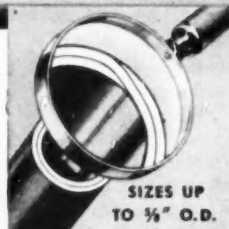
continuously rolled twice around laterally into a tube of uniform thickness,



and passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.

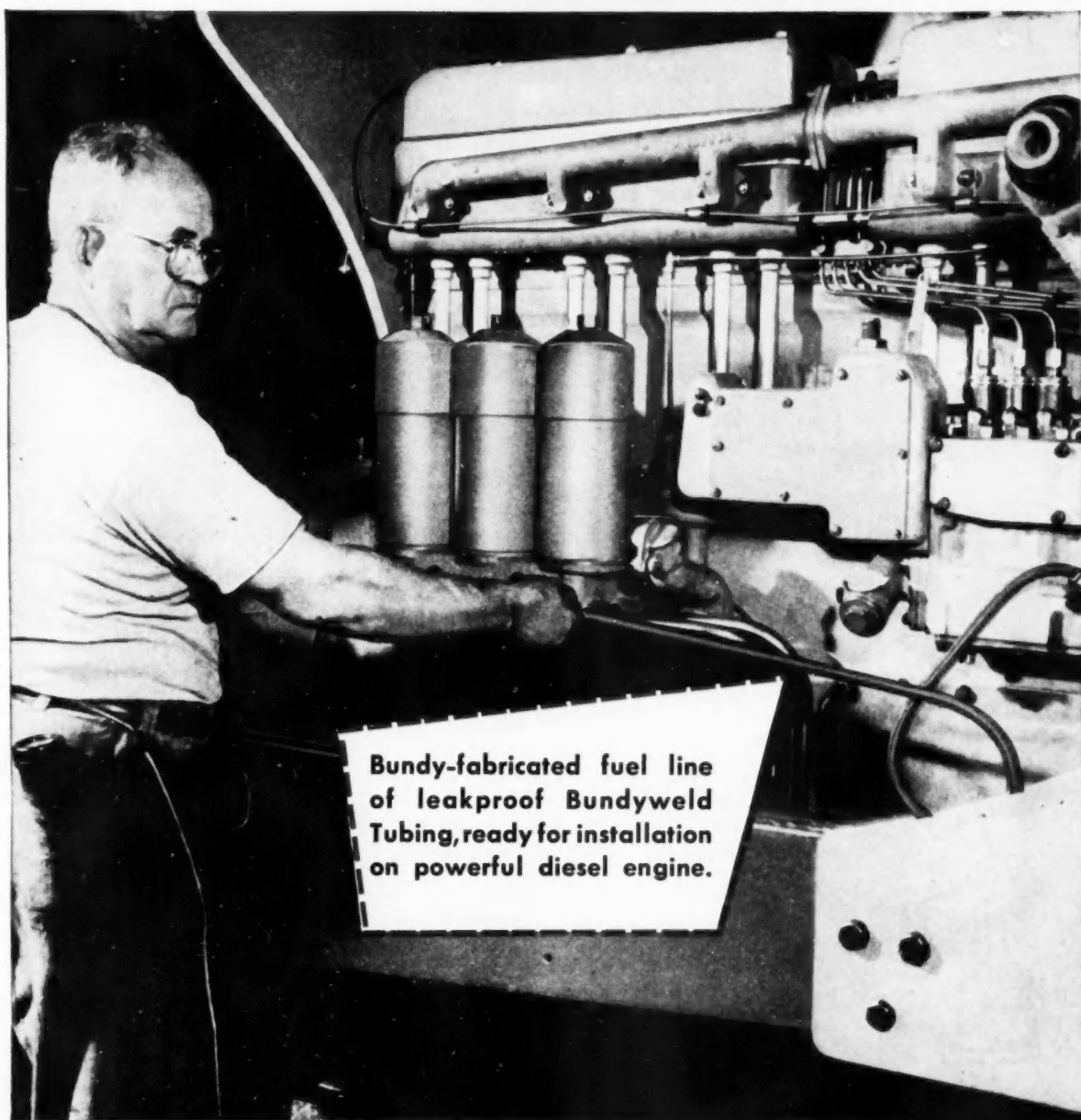


NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

SIZES UP TO 1/2" O.D.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lopham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Ruffin & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., East. • Bridgeport, Conn.: Korhumi Steel & Aluminum Co., 117 E. Washington St. • Los Angeles 58, Calif.: Tubasales, 5400 Alcoa Ave. Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

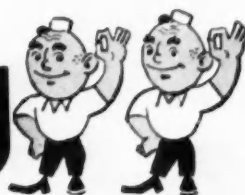




Bundy-fabricated fuel line  
of leakproof Bundyweld  
Tubing, ready for installation  
on powerful diesel engine.

# Bundyweld Tubing®

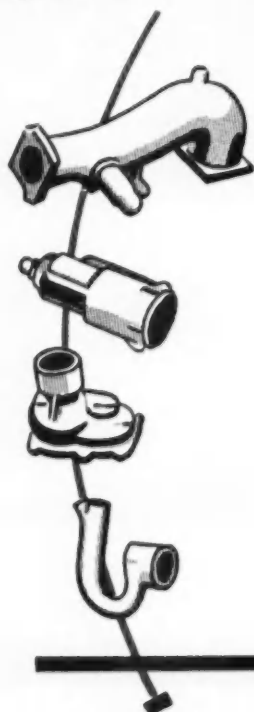
DOUBLE-WALLED FROM A SINGLE STRIP



The freezer's automatic  
The stove and TV too  
The washer shuts itself off  
Then starts itself anew

The car's a Mushomatic Eight  
Remote controlled by knee  
And who's in charge of all  
this stuff?  
Unautomatic mel

## CASTINGS on the lighter side by WELLMAN



If weight is a factor in the product *you're* in charge of purchasing, engineering or manufacturing, turn *automatically* to WELLMAN.

We've been in charge of producing castings on the lighter side, aluminum and magnesium, for almost half a century. Our four complete plants assure you the controlled quality and the easy machinability that help shut off your production problems.

Catalog No. 53 will fill you in on the details.

*Well-Cast* MAGNESIUM AND ALUMINUM CASTINGS  
*Well-Made* WOOD AND METAL PATTERNS



**THE WELLMAN BRONZE & ALUMINUM CO.**

Dept. 3, 12800 Shaker Boulevard Cleveland 20, Ohio

## Trucks With Built-In Roller Conveyors

(Continued from page 59)

Loading docks have roller conveyor tracks sloping two-deg down to the edge, and truck ramps slope down at the same angle. Unloading docks and ramps are slanted oppositely. The second element calls for truck and trailer beds equipped with roller conveyor tracks the same size as those on the docks. Third, standard racks or bins are used for materials. Rack skid rails are attached flush with the feet, the same distance apart as the conveyor rails.

To prepare for loading, completely filled standard racks are placed one at a time or in tiers by fork trucks on the roller conveyors. A load of racks is ready for the truck when it arrives. When dock and truck conveyor rails are matched the racks are allowed to roll into place in the truck. Locking devices on the truck's conveyor rails and sides prevent shifting of the load while the truck is moving.

To unload, the racks are rolled onto dock-side conveyor rails for removal by fork trucks. A hand-operated friction brake on dock conveyor rails slows racks as they roll out of trucks.

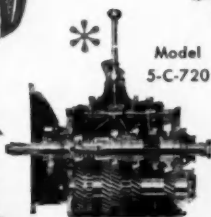
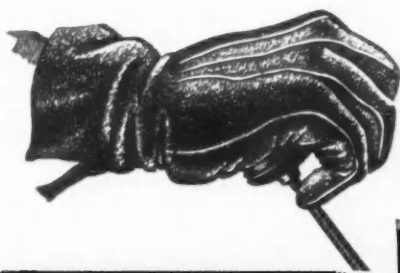
To insure matching with truck rails, end sections of dock conveyor rails are hinged and counterbalanced, and project several inches beyond the edge of the dock. When a truck backs into the dock, the dock rails can be raised or lowered and moved from side to side several inches to "lock up" to the truck bed rails.

At Ford's Rouge, Highland Park and Mound Road plants, where outside storage space for racked parts is available, loading and unloading stations using the same conveyor principles have been erected.

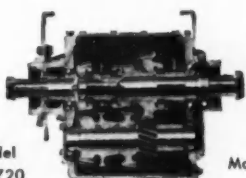
At present, Ford has 17 stations equipped with this system of materials handling. Twenty additional installations are being made in Detroit-area Ford plants. Forty-one Ford-owned trailer trucks, ranging in length from 26 to 40 ft, are conveyor equipped.

### AUTOMOTIVE INDUSTRIES . . .

*is your News Magazine of  
Automotive and Aviation  
MANUFACTURING*

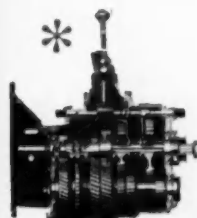


Model  
5-C-720

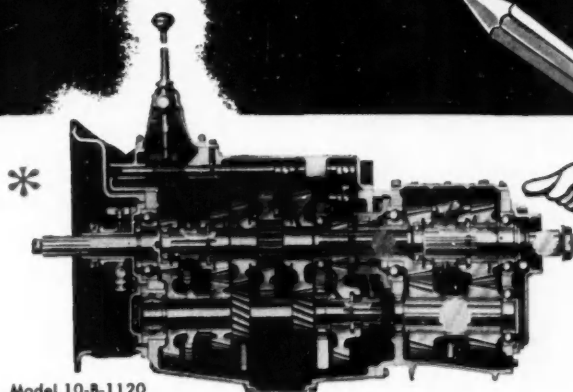


Model 3-A-65

# You write the Specifications!



Model 5-A-620



Model 10-B-1120

Before buying a new truck, you carefully consider all factors related to the job you'll want your truck to do . . . every road and load condition . . . everything that affects your particular operation.

You specify the "make" of truck . . . the type . . . the power plant . . .

## \* Specify the transmission, too!

Among the more than 110 Fuller Transmission models for every, heavy-duty job—there is a "proved in service" unit to fit *your* job . . . designed to operate quietly and dependably . . . profitably . . . and built to stand up under the most grueling conditions, on or off the highway.

Write for Condensed Specification Folder.



**FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN**

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

# Lincoln-Mercury Assembly Plant

(Continued from page 53)

started and the car driven off the line under its own power headed for the final inspection stations. The first of these is wheel alignment and headlamp adjustment, the latter being handled with Weaver electronic inspection equipment. Final check is on the chassis dynamometer where each car is run under power through a

given schedule of road speeds, the operator also being required to make the necessary transmission shifts.

Cars passing these preliminary tests satisfactorily then are driven to the test track for a specified road test. This test track is asphalt surfaced, 20-ft wide and has developed length of 1910 ft.

Having in mind this brief sketch of sub-assembly and assembly operations, it is of interest to visualize some of the basic steps in scheduling production. It must be remembered that the plant builds the full line of Lincoln and Mercury cars. In addition to the variety of body styles for each line, there is the further complication of a wide assortment of colors, and freedom of choice of accessory options from a wide range of such items, including power steering, four-way seats, air-conditioning, radio, power-operated windows, transmissions, trim options, etc. It takes a lot of organization and coordination to achieve the proper flow of cars at any given time and have the cars come off in the way distribution has promised them.

Briefly, scheduling is initiated by the distribution department on the basis of specific orders from the field. In effect, each car built in the plant is a custom built job and it is quite likely that no two cars are alike. Since it is necessary to plan production considerably in advance, a preliminary estimate of requirements is accumulated from the field three months in advance. This makes it possible to estimate requirements for sheet metal, raw materials, and parts.

The schedule is then firmed up two weeks in advance of planning the flow on the assembly line. The final firm schedule, or as firm as it can be made, for daily delivery of cars, subject to parts shortages or other contingencies, is provided by distribution just five days in advance. This takes into account that at the present rate of production close to three days are required to complete a car from start to finish, the extra two days being taken to allow for paper work and final car preparation for delivery.

Scheduling is handled by Telautograph equipment, using three transmitters—one in the body fabrication department, one in body paint shop, and the third at the end of the trim line. The composition of the bank of finished bodies naturally controls assembly operations at any given time.

Coordination of the transmitters with control stations at the various sub-assembly stations and chassis assembly is handled through a system of 28 receivers. Eight of these are located in the body department; ten in the trim department; and 11 in the assembly department. Assembly department receiver locations are as follows: frame, engine, wheel and tire assembly, bumpers, steering column, fenders and hoods, and four in the cushion areas.



**LOWER THE  
BOOM ON COSTS  
SET RIVETS  
FAST**

*2 at a time with the*  
**Chicago**  
**"214"**

• With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" diameter or smaller steel tubular rivets—lengths to 7/8". Quick Change Rotary Type Hoppers and Raceway permit 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to versatility. For help with fastening problem . . . send sample assembly (or a blue print) for free fastening analysis.



**FREE CATALOG** contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

**Chicago Rivet & MACHINE CO.**  
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois  
Branch Factory: Tyrone, Pa.



# THOMPSON ENGINEERS LIGHT METAL CASTINGS

## FOR ALL INDUSTRY

# Versatility

today keynotes more and more the operations at Thompson Products Light Metals Division. Light, strong, durable metal castings are constantly being engineered, designed, developed and produced by Thompson's exacting engineers for a wide range of customer uses.

A background of over 50 years in research and manufacture of precision metal parts enables Thompson to offer aid to all forms of industry. Today it is producing light metal castings for such diversified products as aircraft and washing machines; buses and garbage disposers; tractors and outboard motors; automobiles and industrial engines.

Regardless of your product, if you use castings, Thompson's creative engineers will gladly show you where and how you can simplify your operations and save on costs with Thompson's Light Metal Castings.

Write or phone Light Metals Division, Thompson Products, Inc., 2269 Ashland Rd., Cleveland 3, Ohio.

**AIRCRAFT**  
A carbon pile regulator  
—a high pressure  
aluminum die casting.



**APPLIANCES**  
A garbage disposer  
housing—one of  
several permanent  
mold castings  
Thompson makes  
for garbage  
disposer units.



**AIRCRAFT**  
An alternator housing  
used on  
jet aircraft engines.



**APPLIANCES**  
Die cast motor end frames  
used on appliance and  
industrial electric motors.



For a detailed description of the Thompson Light Metals Division operations, send for your free copy of "Creative Castings". "Steel Belted Pistons", detailing this Thompson development, is also available. Just write, on your company stationery, to Dept. A2, Light Metals Division, Thompson Products, Inc., 2269 Ashland Road, Cleveland 3, Ohio.

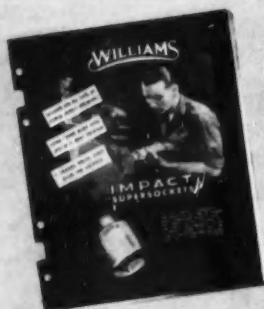
You can count on  
**Thompson  
Products**

**LIGHT METALS DIVISION**  
2269 Ashland Road      Cleveland 3, Ohio

# "How to Select the Right PRODUCTION Sockets"



SQUARE DRIVE SIZE		1/4"	3/8"	1/2"	5/8"	3/4"	1"	1-1/4"
REGULAR LENGTH SOCKETS	HEXAGON OPENINGS	3/16" to 7/16"	5/16" to 3/4"	3/8" to 1-1/4"	1/2" to 1-1/2"	1/2" to 1-11/16"	3/4" to 3-3/8"	1-5/16" to 3-1/2"
	SURFACE DRIVE OPENINGS	----	3/8" to 9/16"	7/16" to 7/8"	5/8" to 1-1/4"	----	----	----
	DOUBLE SQUARE OPENINGS	5/16" to 7/16"	5/16" to 5/8"	3/8" to 1"	9/16" to 1-1/8"	9/16" to 1-1/4"	3/4" to 2-3/4"	----
BOLT CLEARANCE LENGTH SOCKETS	HEXAGON OPENINGS	1/4" to 3/8"	5/16" to 5/8"	3/8" to 1"	9/16" to 1-1/16"	9/16" to 1-5/8"	3/4" to 2-3/8"	----
	SURFACE DRIVE OPENINGS	----	3/8" to 9/16"	7/16" to 13/16"	5/8" to 1"	----	----	----
	DOUBLE SQUARE OPENINGS	----	----	----	----	----	3/4" to 2-3/8"	----
SPECIAL SOCKETS FOR HARDENED TAPPING SCREWS	REGULAR	3/16" to 3/8"	5/16" to 9/16"	3/8" to 9/16"	----	----	----	----
	WITH CARBIDE INSERTS	1/4" to 7/16"	5/16" to 1/2"	----	----	----	----	----
ACCES- SORIES AND ATTACH- MENTS	EXTENSIONS (Lengths)	2" and 6"	3" and 6"	5" and 10"	6" and 10"	7", 10" and 13"	6" and 12"	6" and 12"
	HEX. SQUARE SHANKS (Size Hex)	1/4"	7/16"	7/16" or 5/8"	5/8" or 3/4"	3/4"	3/4"	----
	MAGNETIC SHANKS (Sockets to Fit)	1/4" to 3/8"	----	----	----	----	----	----
	ADAPTERS	----	----	----	----	3/4" F 1" M	1" M 3/4" F	----



The right IMPACT Sockets speed assembly, increase efficiency and cut costs. There are over 500 sockets and accessories in the complete Williams line. You will find adaptations for all types of power wrenches... impact, and single or multiple nut runners. They can also be used with Williams hand drivers.

The simplified check chart here, together with Catalog A-100 make a convenient guide in selecting the best to use in your operation. Your industrial supplier can fill your requirements from local stock.

*A request on your company letterhead will bring you Catalog A-100.*

**J. H. WILLIAMS & CO.**

531 Vulcan Street

Buffalo, N.Y.

**Be Wise... Buy WILLIAMS IMPACT "Supersockets"®**

## News of the MACHINERY INDUSTRIES

(Continued from page 71)

### H-M Replacements

Since the Hydra-Matic fire, there has been a great deal of activity in machine tool circles for the machine restoration program. In addition to the rebuilding and replacement of fire-damaged equipment, some machine tool companies are receiving orders for more machines than those they had originally built for the Livonia plant.

Avey Drilling Machine Co., for example, had built 35 machines for the original setup. Now, in addition to rebuilding or replacing those machines, GM has ordered from 15 to 25 additional drilling machines.

Industry sources claim that, even after Livonia is rebuilt, GM will maintain at least four suppliers for Hydra-Matic transmissions. This program would require a vast amount of plant and production equipment.

### Distributors Meeting

At the American Machine Tool Distributors Association 29th Annual Meeting held in White Sulphur Springs, W. Va., Thomas R. Rudel, president of the Rudel Machinery Co., Inc., was elected to the presidency of the Association. Mr. Rudel also serves on the board of directors of Avey Drilling Machine Co., American SIP Corp., and Hendey Machine Co.

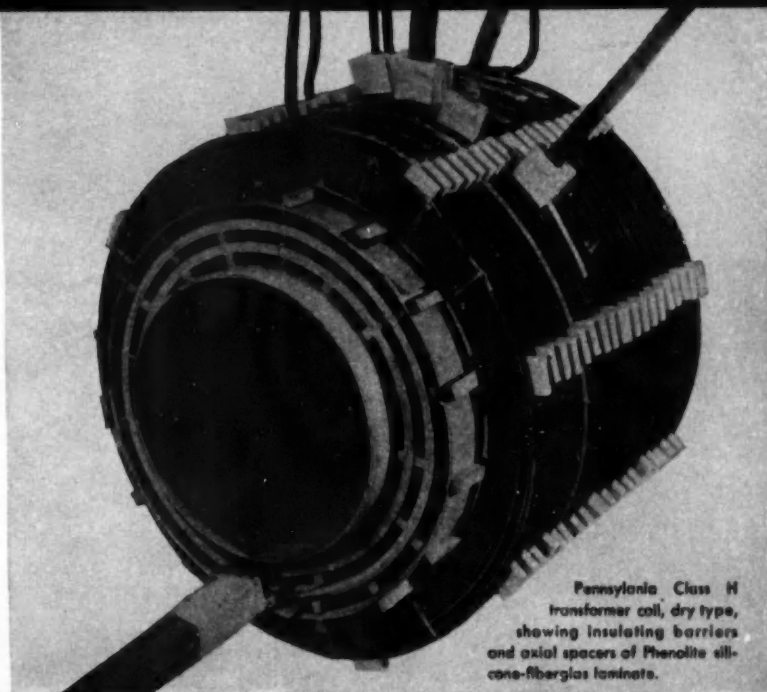
Other officers elected were: R. A. Vidinghoff of Machinery Associates, Inc., Wynnewood, Pa., first vice-president; H. R. Hanson of Wm. K. Stamets Co., Cleveland, Ohio, second vice-president; J. F. Owens, Jr., J. F. Owens Machinery Co., Syracuse, N. Y., secretary-treasurer.

### Canadian Transfer Machine

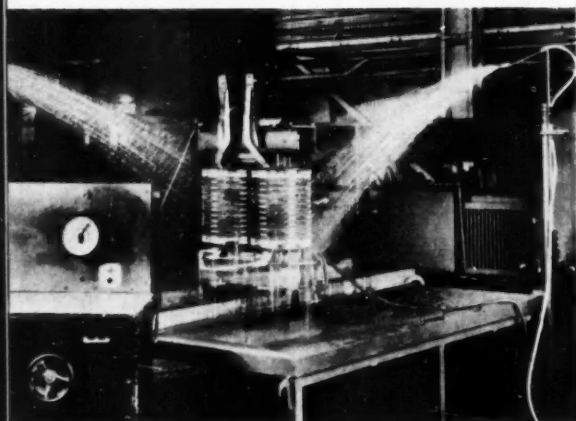
Modern Tool Works, Toronto, has developed a new transfer machine which does eight operations in sequence on parts for Lincoln and Meteor cars. Parts are turned out at the rate of 125 per hour. The machine, costing about \$180,000, was ordered by Ford Motor Co. of Canada, Windsor, Ont. This is one of the first transfer machines made by a Canadian machine tool company; most such machines are brought into Canada from builders in the U. S.

# class h insulation by National Vulcanized Fibre Co.

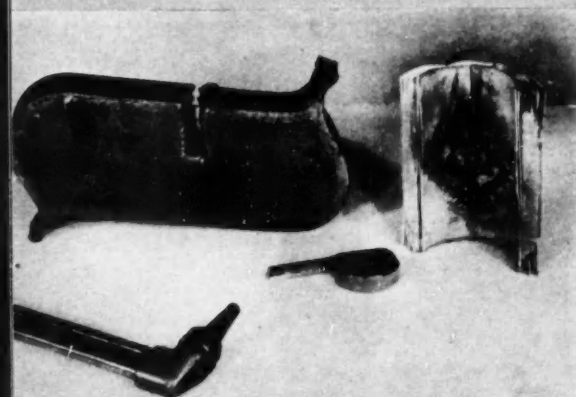
used by Pennsylvania  
Transformer Co. to build  
new, safe, and reliable Sealed  
Dry Type Transformers



Pennsylvania Class H  
transformer coil, dry type,  
showing insulating barriers  
and axial spacers of Phenolite sil-  
icone-fiberglass laminates.



Transformer core and coil assembly under full voltage ex-  
citation withstands heavy water shower. The insulation resist-  
ance remained at infinity megohms during the entire two-hour  
water test.



Class H insulation resists fire and combustion. The heat of the  
5000° F. Oxygen-Acetylene torch, applied for the same inter-  
val, burned through the 2-inch steel plate, yet merely melted  
some of the glass fabric in the barrier.

Using Class H insulation (Phenolite silicone-fiberglass laminate), the Pennsylvania Transformer Company (a McGraw Electric Co. Division) builds Sealed Dry Type Transformers having many superior and safe operation features. The Class H Insulation eliminates the hazards of fire and explosion, permits up to 50 per cent weight reduction, makes possible efficient operation in humid atmosphere, reduces maintenance, allows operation at high temperatures, and permits frequent overloads. The coil barriers are made from 1/32 inch silicone sheets bonded with silicone rubber. The sheets are rolled directly onto the lathe during the coil winding operation, saving the high cost of a mandrel. Ideal for station auxiliary, unit sub-station and network service, these Sealed Dry Type Transformers are an outstanding example of National cooperative engineering and research. Perhaps you have an insulating problem where National Vulcanized Fibre Company can give you real help in solving your particular problem . . . economically. Write us—our engineering service is immediately available.

*National laminated plastics  
nationally known—nationally accepted*

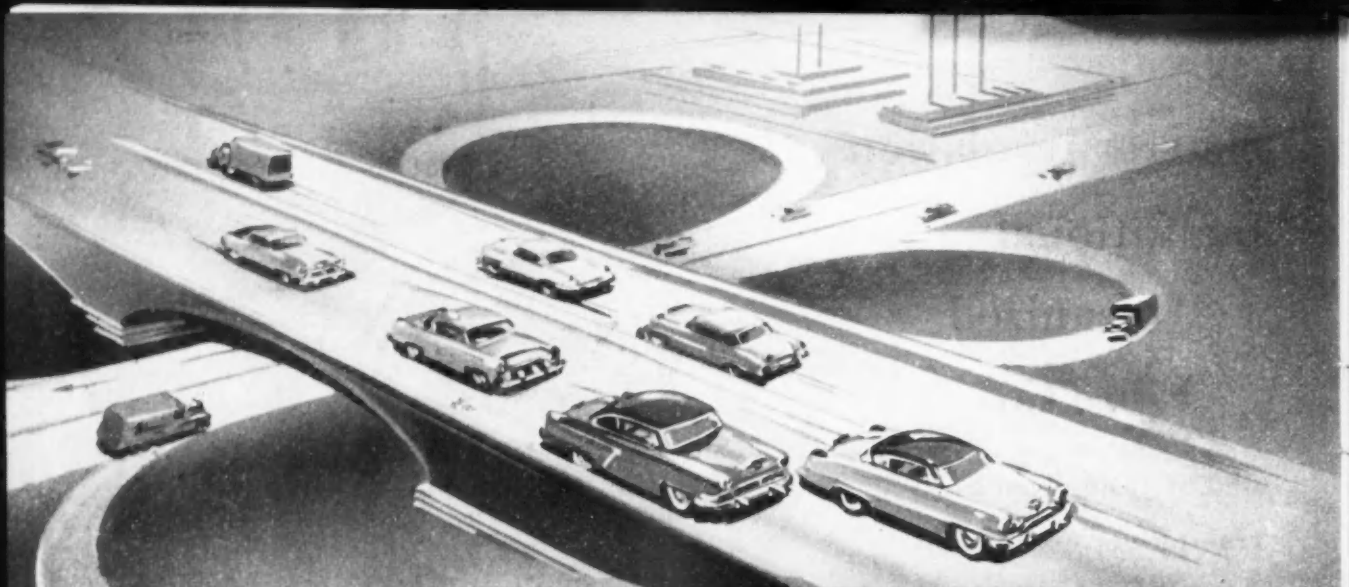
**NATIONAL  
VULCANIZED  
FIBRE**

**PHENOLITE**  
Laminated PLASTIC

**NATIONAL VULCANIZED FIBRE COMPANY**  
Wilmington, Delaware

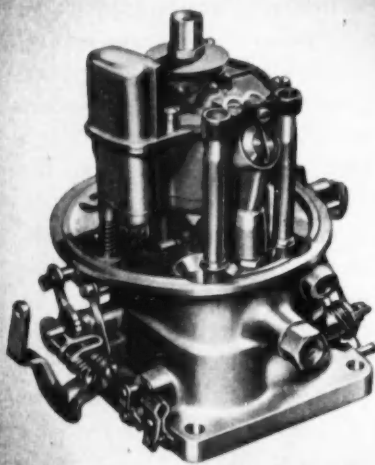


Offices in  
Principal  
Cities



## First and Only Fuel-and-Ignition Combination

Another **HOLLEY** *engineering first!*



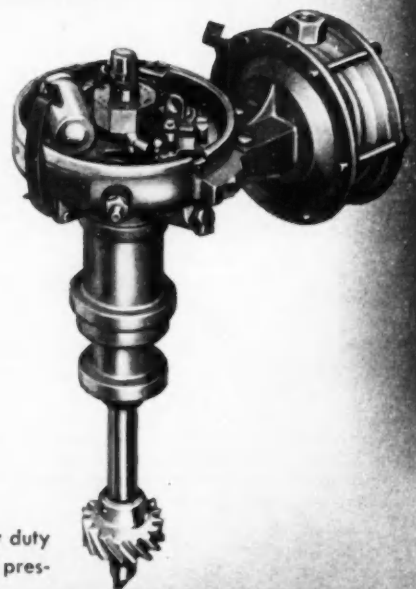
**HOLLEY CENTRI-QUAD**

Designed to add horsepower to present day engines, the Holley Centri.Quad is the only carburetor to combine four barrels into one carburetor with one float assembly. The concentric design prevents loading or starving during sharp turns and fast stops and starts. The Centri.Quad is designed for the same basic air cleaner installations as used on the Centri.Flo.

*with*

### **HEAVY DUTY PRESSURE DISTRIBUTOR**

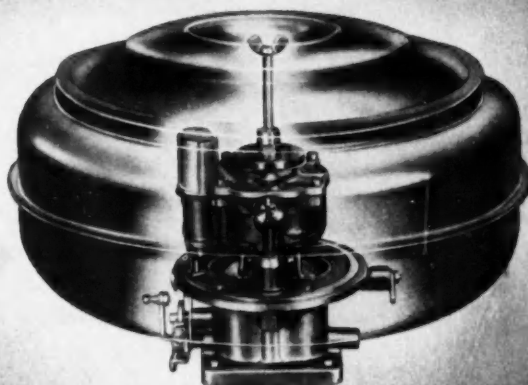
Designed for use on maximum horsepower engines, the heavy duty distributor is a dual-diaphragm "big brother" to the standard pressure distributor.



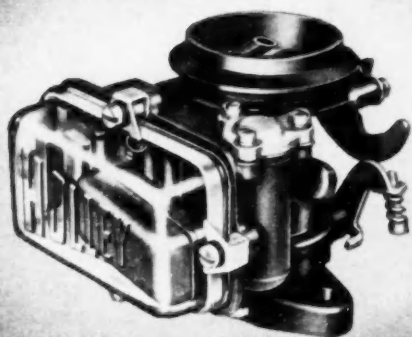


### HOLLEY CENTRI-FLO

This true concentric carburetor is designed with all important metering parts at the center line of the fuel bowl. The CentriFlo assures smooth, uninterrupted engine performance during fast stops and starts and sharp turns. The unique carburetor and air-cleaner combination allows lower hood lines—meets the modern styling trends.



*or*



### HOLLEY VISI-FLO

The clear glass fuel bowl and the replaceable metering unit features of the VisiFlo revolutionized carburetor service. This compact carburetor—only four inches high—can be used where limited overhead space ordinarily requires special manifold design.

### PRESSURE DISTRIBUTOR

Using pressures that exist within the carburetor, the Holley pressure distributor meters spark in exact relation to power requirements and fuel flow—provides quicker, smoother performance and greater fuel economy. It is the only distributor now available that eliminates the need for a centrifugal advance mechanism.

*with* →



## SYNCHRONIZED CARBURETORS AND DISTRIBUTORS GIVE MAXIMUM ENGINE PERFORMANCE

Holley was the first to unite the carburetor and distributor into a coordinated team. The Holley pressure distributor operates from pressures generated within the carburetor, and meters spark in direct relation to power requirements and fuel flow.

Each of the Holley carburetors on this page are designed to produce maximum engine performance when installed with a Holley pressure distributor. There is a combination available for nearly every engine now in use or now being designed for the automotive industry.

FOR MORE THAN HALF A CENTURY—  
ORIGINAL EQUIPMENT MANUFACTURERS  
FOR THE AUTOMOTIVE INDUSTRY.



### ARE YOU WONDERING . . .

How to do a good job of fuel metering better? Let Holley engineers listen, test, design, and recommend.

**HOLLEY**  
*Carburetor Co.*

DETROIT 4, MICHIGAN



Yes, the Ransburg story of cutting painting costs to a fraction of the cost of other methods does sound good. It is good!

On most factory production lines, the Ransburg electro-coating processes will provide 2 to 4 times more parts per gallon of paint—automatically—with one operator doing the work of many.

**That's because the Ransburg No. 2 Process is the most efficient spray coating process ever developed for industry's use.**

If you are a manufacturer of painted products, and if your work volume warrants conveyerized painting, we'd like to tell you more about the production efficiency of the RANSBURG No. 2 PROCESS as it applies to YOUR production. Too, we'd like to show you typical examples of customers' production lines where the Ransburg No. 2 Process is setting new quality standards . . . increasing production . . . and at the same time, saving manpower, money and materials.

Write for literature, or send for "Miracles In Painting"—our new 16mm. sound and color movie which shows on-the-job examples of Ransburg Processes at work in industrial plants all over the nation.



**Ransburg ELECTRO-COATING CORP.**

**INDIANAPOLIS 7, INDIANA**

## More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from August 19, 1953, to September 25, 1953. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

### — A —

**Aerol Company, Inc., Los Angeles, Calif.**  
Wheel assembly—1421 ea—\$35,880  
**Ainaworth Manufacturing Corp., Detroit, Michigan**  
Automotive spare parts—10,800—\$55,899  
**Airborne Accessories Corp., Hillside, New Jersey**  
Actuator—Various—\$562,023  
Actuators—42 ea—\$81,909  
**Aircooled Motors, Inc., Syracuse, New York**  
Liner crankshaft, crankcase assy—Various—\$44,022  
**American Bosch Corp., Springfield, Mass.**  
Maintenance parts—Various—\$50,762  
Magneto assy—44 ea—\$25,902

### — B —

**Bendix Aviation Corp., Bendix Products Div., S. Bend, Indiana**  
Maintenance parts—1540 ea—\$909,376  
Strut assemblies—Various—\$1,719,153  
Strut assemblies—Various—\$827,523  
Maintenance parts—2310 ea—\$2,075,319  
Fuel pumps—1680 ea—\$2,367,238  
**Bendix Aviation Corp., Eclipse Pioneer Div., Teterboro, N. J.**  
Vehicle parts—12,050—\$54,266  
**Bendix Aviation Corp., Pacific Div., N. Hollywood, Calif.**  
Actuators—254 ea—\$27,203  
Pump assy—Various—\$47,074  
**Bendix Aviation Corp., Red Bank Div., Eatontown, N. J.**  
Inverters—903 ea—\$690,944  
14 ea  
83 ea  
**Bendix Aviation Corp., Scintilla Magneto Div., Sidney, New York**  
Maintenance parts—Various—\$43,110  
**Borg Warner Corp., Warner Gear Div., Muncie, Indiana**  
Vehicle parts—8500—\$25,245

### — C —

**Caterpillar Tractor Co., Peoria, Illinois**  
100KW Diesel units—62 ea—\$820,628  
Spare parts—lot  
**Chrysler Corp., Detroit, Mich.**  
Automotive spare parts—14,000—\$41,188

(Turn to page 114, please)

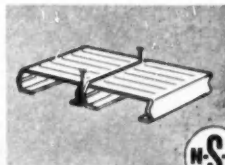
**for Greater Strength  
with Lighter Weight  
in modern  
material handling equipment**

**N·A·X**  
HIGH-TENSILE STEEL



THE EVANS DF LOADER is a product of Evans Products Co., Plymouth, Mich. DF means Damage - Free, Dunnage - Free.

NAILABLE STEEL FLOORING for boxcars, flatcars and gondolas is made of N-A-X HIGH-TENSILE steel, and is a product of Steel Floor Division, Great Lakes Steel Corporation.



Engineering data on these products available upon request to the manufacturers.

The increasing use of the Evans DF Loader reflects the progress of railroads toward more efficient material handling methods.

In the DF Loader there is high strength with minimum weight through the use of N-A-X HIGH-TENSILE steel. This low-alloy steel has 50% greater strength than mild carbon steel, with greater resistance to corrosion with either painted or unpainted surfaces.

You can get the same results as Evans. Your product can be made stronger, lighter in weight and longer-lasting, when you specify N-A-X HIGH-TENSILE steel.

The "Wonder Bar," a section of which is shown at left, is a vital part of the Evans DF Loader. It is a wooden bar reinforced by a Z-bar made of N-A-X HIGH-TENSILE.

The "Wonder Bar," when locked into place, secures all kinds of lading. It is strong enough to resist shifting load stresses in moving boxcars, yet so light that one man can lift it into position. The DF Loader provides real operating economies for both railroads and shippers.

Another modern product for efficient transportation equipment is Nailable Steel Flooring, also made of N-A-X HIGH-TENSILE steel.

**GREAT LAKES STEEL CORPORATION**

N-A-X Alloy Division

Corse, Detroit 29, Mich.

**NATIONAL STEEL**



**CORPORATION**

(Continued from page 112)

Automotive spare parts—178,100—\$524,207  
Trucks—284—\$994,853  
Automotive spare parts—318,200—\$216,036  
Axles, rear & front—2000—\$614,000  
Clark Cable Corporation, Cleveland, Ohio  
Vehicle parts—200—\$63,490  
Consolidated Vultee Aircraft Corp., San Diego, Calif.  
Trainers—5—\$750,000  
Continental Aviation & Engineering Corp., Detroit, Michigan  
Maintenance parts—Various—\$80,869  
Continental Motors Company, Detroit, Michigan

Spare parts—\$187,190  
Tank spare parts—1/2 set—\$72,570  
Conversion—Lot—\$34,346  
Continental Motors Corp., Muskegon, Michigan  
Truck spare parts—60,000—\$192,300

#### — D —

Dana Corporation, Toledo, Ohio  
Vehicle parts—8500—\$118,789  
Detroit Aluminum & Brass, Detroit, Michigan  
Hardware—20,000—\$66,600  
Diamond T Motor Car Company, Chicago, Illinois  
Vehicle parts—7500—\$44,310  
Douglas Aircraft Company, Ltd., El Se-

gundo, Calif.  
Maintenance parts—Various—\$45,366  
Aviation armament spares—Various—\$131,124  
DuPage Gear & Machine Co., Elmhurst, Illinois  
Vehicle parts—650—\$25,545  
Vehicle parts—16,000—\$42,768

#### — E —

Eidal Manufacturing Company, Inc., Albuquerque, New Mexico  
Vehicles—161—\$497,620

#### — F —

Fargo Motor Corp., Detroit, Michigan  
Trucks—20—\$56,502  
Fruehauf Trailer Company, Detroit, Michigan  
Hardware—1040—\$35,651

#### — G —

General Controls Company, Glendale, Calif.  
Fuel valve assy—Various—\$34,391  
General Electric Company, Schenectady, New York  
Spare parts—\$2,000,000  
General Electric Company, Phila., Pa.  
Indicators—104 ea—\$26,826  
GMC, AC Spark Plug Div., Flint, Michigan  
Auto spare parts—78,450—\$221,657  
Automotive spare parts—33,000—\$95,530  
GMC, Chevrolet Motor Div., Detroit, Michigan  
Trucks—51—\$59,269  
General Motors Corp., Harrison Radiator Div., Lockport, N. Y.  
Oil cooler—47 ea—\$62,304  
GMC, Truck & Coach Div., East Pontiac, Michigan  
Vehicle parts—8000—\$40,744  
Automotive spare parts—84,650—\$484,261  
GMC, United Motors Service, Detroit, Michigan  
Vehicle parts—16,000—\$92,160  
Vehicle parts—25,000—\$49,000  
The Goodyear Tire & Rubber Co., Inc., Akron, Ohio  
Lining—52,560 ea—\$109,796  
Maintenance parts—Various—\$41,801  
Wheel and brake assy—219 ea—\$39,475  
Wheel assy—619 ea—\$104,611  
Gould-National Batteries, Inc., Depew, New York  
Battery—Various—\$40,945

#### — H —

Holley Carburetor Company, Detroit, Michigan  
Spare parts—Various—\$142,652  
Hydro-Aire, Inc., Burbank, Calif.  
Valves—Various—\$38,890

#### — I —

International Harvester Company, Chicago, Illinois  
Vehicle parts—5450—\$184,418

#### — K —

Kohler Company, Kohler, Wisconsin  
Engine generator—47 ea—\$179,979

(Turn to page 116, please)

# now there are 12

## leading manufacturers of autos, trucks and tractors who



# control with DOLE



Each year more of the biggest names in the American Automobile Industry are switching to Dole Thermostats for more accurate control of cooling systems. Dole Thermostats are specially engineered for modern high compression engines and pressure cooling systems. Specify Dole with confidence and help assure a smooth running motor.



Protect Your Good Name  
with Another

Control with Dole

# DOLE

THE DOLE VALVE COMPANY

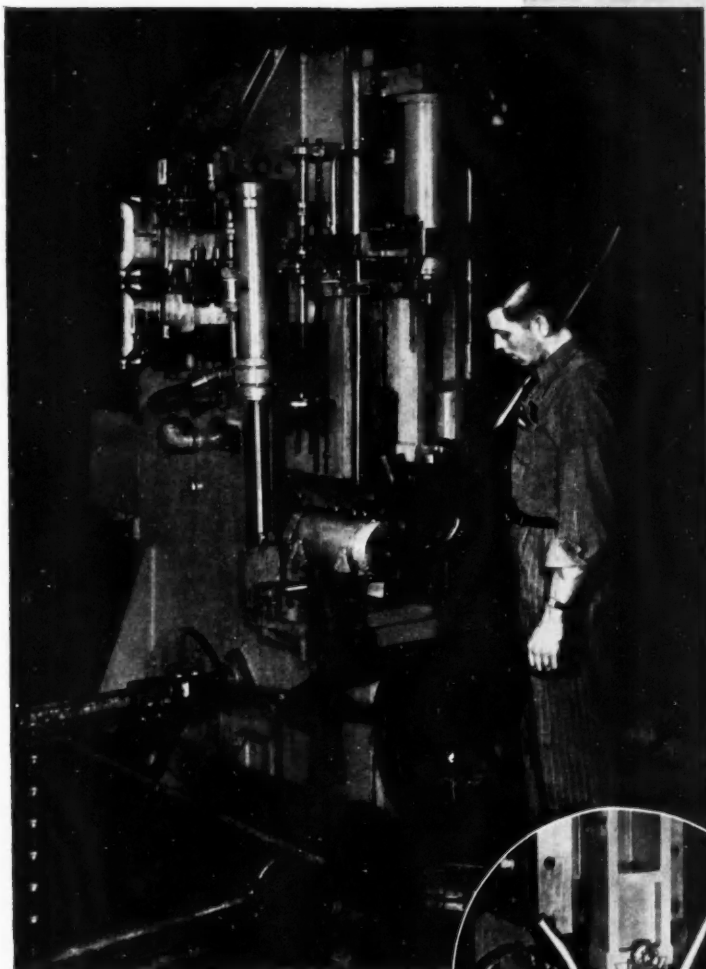
1901-1901 W. Carroll Ave., Chicago, Ill.  
Philadelphia - Dallas - Los Angeles



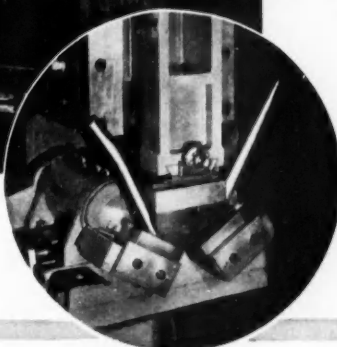
# New PINES 20-TON BENDING PRESS

## PRODUCES AUTOMOTIVE EXHAUST PIPES

**50%  
FASTER**



▲ Production view of new Hydraulic Bending Press now producing, in a single setup and with one operator, 4 to 8 multiple bends on automotive exhaust and tailpipes at speeds from 600 to 800 bends per hour.



◀ Closeup view of Pines Bending Press forming 4th bend in a 1 1/2" (16 ga.) CRS automotive exhaust pipe. Note how wing dies are controlled by side-mounted cushions through heavy crank arms. Interchangeable pick-off turret of angle-of-bend selector saves set-up time on repeat jobs.

### CHECK THESE COST-CUTTING PRODUCTION FEATURES

- ✓ **Twin Equalizing Side-Mounted Cushions** — provide greater working clearance, maintain constant torque, reduce flattening and distortion.
- ✓ **Fastest Cycling** — angle-of-bend selector indexes and resets to starting position automatically without indexing through idle stations, increases output.
- ✓ **Greater Work Handling Capacity** — extra clearance reduces number of setups on multiple bending, permits broader use of uniform radii, cuts tooling and production costs.
- ✓ **Interchangeable Pick-Off Turret** — for angle-of-bend control. Permits storing and remounting for repetitive jobs, reduces setup time.
- ✓ **Adjustable Ram Speed Control** — assures efficient operation, simplifies setups. Ram can be lowered slowly or stopped at any point.

#### WRITE FOR NEW 4-PAGE BULLETIN

Write today for free bulletin completely illustrating and describing the new Pines Bending Press and its cost-cutting production features.



**PINES** ENGINEERING CO., INC.  
Specialists in Tube Fabricating Machinery 650 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

# GET DUMORE

## the drill head with automatic built-in controls



### Self-Contained Air

No cumbersome air lines to hook up. Simply plug into electrical outlet. Built-in rotary air compressor advances drill at required speed and feed for new resistance drilling.

### New Resistance Drilling

Provides completely automatic operation. Self-compensating control of drill by combined action of Air Feed Pressure Regulator and built-in return spring allows material being drilled to govern rate of drill feed and speed.

### Adjustable Stroke Control

Select depth of stroke by adjustable stop nuts. Allows measured depth drilling from 1/32" to 1-1/8". Can be controlled to .004" preciseness.

### Air Feed Pressure Regulator

Permits adjustment of pressure up to 15 P.S.I. Allows for variation in drill size. This simple control governs rate of drill advancement in work.

### Automatic Chip Clearance

Depth Staging feature provides retraction of drill at proper intervals for chip clearance. Prevents drill breakthrough, practically eliminates costly drill breakage.

### Maximum Drilling Production

Automatic operation of drill allows free use of operator's hands. Fast, one-time setup makes this machine ideal for simultaneous operations.

and get all these cost reducing benefits



Motor manufacturer doubled output on armature shaft drilling. Decreased drill breakage 25 times.

Unusual setup drills bronze nozzle holders. Labor costs slashed \$75 on first run of 5275 pieces.

Sound equipment manufacturer cashed in on big savings. Cut drill breakage to the bone.

WITH the Dumore automatic drill head, you can say goodbye to excessive drill breakage, down time and scrap loss on small diameter, deep hole drilling. And just as important, you increase drilling capacity.

Get all the information about this

revolutionary tool. Ask for demonstration. See how it eliminates operator guesswork and provides completely automatic control, flexibility of setup, big cost reductions at desirably low cost.

Call your distributor today, or write for bulletin.

## DUMORE PRECISION TOOLS

The Dumore Company

1339 Seventeenth Street

Racine, Wisconsin

(Continued from page 114)

### — L —

Lansing Drop Forge Company, Lansing, Michigan  
Vehicle parts—50,000—\$588,000  
Lockheed Aircraft Corp., Marietta, Georgia  
Repair—\$115,000

### — M —

The Glenn L. Martin Company, Baltimore, Maryland  
Parts—Various—\$26,563  
Mar Vista Engineering Company, Los Angeles, Calif.  
Hydraulic valve—Various—\$67,615  
Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota  
Power and tank units—Various—\$79,927  
Indicator—Various—\$69,631  
Motor Wheel Corp., Lansing, Mich.  
Vehicle parts—1460—\$27,243

### — N —

North American Aviation, Inc., Los Angeles, Calif.  
Aircraft maintenance handbooks—\$100,000  
Design, installation and test—\$306,500  
North American Aviation, Inc., Columbus Div., Columbus, Ohio  
Parts—Various—\$44,776

### — P —

Pacific Airmotive Company, Burbank, Calif.  
Valve assys—Various—\$79,496  
Pan American World Airways, Inc., Brownsville, Texas  
Overhaul of Engines—2142 ea—\$3,043,798

### — R —

Rec Motors, Inc., Lansing, Michigan  
Trucks—5400—\$38,356,988  
Automotive spare parts—11,900—\$139,944  
Automotive spare parts—60,800—\$6,062,092  
Revere Camera Company, Chicago, Illinois  
Actuators—546 ea—\$200,544  
Actuators—379 ea—\$133,306  
Rockford Clutch Div., Rockford, Illinois  
Hardware—2900—\$31,581

### — S —

Sperry Gyroscope Company, Div. Sperry Co., Great Neck, New York  
Bracket and drum assy—Various—\$96,095

### — U —

United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.  
Material—148 ea—\$112,184  
Spare parts—Various—\$60,381  
Spare parts—21 ea—\$11,907  
Maintenance parts—Various—\$271,258  
Spare parts—Various—\$110,311  
Material—Various—\$146,151  
Material—49,072 ea—\$62,321

(Turn to page 119, please)



bright  
strong

easy to  
form

for everything  
**AND** the kitchen  
sink

**Superior**



**Stainless**

STRIP STEEL

SINK RIMS are an excellent example of Superior Stainless in service—all the way from initial ease of fabrication, through simplicity of installation, to life-long durability on the job. Rims of Superior Stainless stay bright with a wipe—can't rust, peel or chip—add value to the entire kitchen unit! • Let's help you find your profit-application for Superior Stainless Strip Steel. Write us about your product, today.

**Superior Steel**

CORPORATION

CARNEGIE, PENNSYLVANIA

# READY

for the JET AGE



**SKF**®  
BALL AND ROLLER BEARINGS

In long and close association with the aircraft industry, it has always been the aim at SKF to anticipate the future. SKF research, engineering and production has always been *ready* when power plant designers demanded bearings to withstand tougher and tougher punishment.

To SKF the challenge of *tomorrow* is as important as today's success... the challenge, always successfully met, of helping all industry put the right bearing in the right place.

7464

**SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.**  
— manufacturers of SKF and HESS-BRIGHT bearings.



(Continued from page 116)

**United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Connecticut**

Spare parts—Various—\$60,210  
Spart parts—Various—\$183,873  
Spare parts—Various—\$638,098  
Material—Various—\$604,625  
Spare parts—Various—\$16,051  
Washers, linkrod assy and linkrods AF-MIPR (33-600) R-51-3N (Item 7A) — Various — \$739,588  
Spare parts—Various—\$126,066  
Spare parts—Various—\$34,381  
Spare parts—Various—\$504,943  
Spare parts—Various—\$182,342  
Spare parts—Various—\$973,526  
Material—Various—\$146,695

**United Aircraft Products, Inc., Dayton, Ohio**

Tube oil cooler—806,000 ea—\$33,852

**— V —**

**Vectron, Inc., Waltham, Mass.**

Indicator—5 ea—\$195,160

**— W —**

**Westinghouse Air Brake Company, Pittsburgh, Pa.**

Trainer flight simulator—1 ea—\$195,824

**Westinghouse Airbrake Co., Union Switch & Signal Div., Swissvale, Pa.**

Simulator—Lot—\$392,425

Trainer F-101—1 ea—\$1,900,000

**The White Motor Company, Cleveland, Ohio**

Commercial vehicles—2600—\$46,070

## McCULLOCH SUPERCHARGER

(Continued from page 58)

Another unique feature is the planetary ball bearing drive. This new drive operates on the principle of a planetary gear set—but has no gears. Balls replace the planet gears, an inner race takes the place of the sun gear, and a split, spring-loaded outer race is used instead of a ring gear. The ratio, impeller to pulley, is 4.4 to 1.

An independent pressure oiling system, including a reservoir, provides lubrication for the supercharger.

The McCulloch VS-57, which is made in one size only, is said to be suitable for most passenger and sports cars. Obviously, individual mounting brackets and other fittings are required for various engines. Kits are available for installing the supercharger on Fords and Mercurys; kits for other makes of cars will be introduced as soon as possible.

**AUTOMOTIVE INDUSTRIES  
Keeps You Informed**

## a new Automotive Water Pump Seal...

**WITH SPRING ENCLOSED**

Labels in diagram:  
SEAL RETAINER  
SPRING  
SYNTHETIC RUBBER FLEXING MEMBER  
METAL BAND  
PRECISION-LAPPED SEALING WASHER  
HOLDING DENTS

### “JOHN CRANE” Type 11A\* “Pressed-In” Seal

Since the spring is enclosed by the synthetic rubber flexing member, this new “John Crane” Type 11A Seal has definite advantages on small water pump or other liquid seal applications where it is desirable to protect the spring from corrosive liquids. It also eliminates the need for expensive corrosive resistant spring material. Additional outstanding design features of this seal are:

1. Compact—a “pressed-in”, one unit seal.
2. Washer held stationary by metal retainer; no damaging stresses on flexible bellows.
3. Easy to install on production lines.
4. Retainer does not contact the shaft, thus many sizes can be handled, namely,  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{5}{8}$ " and all intermediate shaft diameters.
5. Handles pressures to 50 psi and temperatures to 212° F.
6. For use with high shaft speeds (6000 RPM and up) and where shaft vibration is present.
7. Mass production means low unit cost.

**CRANE PACKING COMPANY**  
1835 Cuyler Avenue, Chicago 13, Ill.

Our new illustrated catalog is available.  
Typical Installation of Seal in Small Circulating Pump.

\*PROTECTED BY U.S. Patent No. 2645608  
also patents in all principle foreign countries.

**JOHN CRANE**  
**CRANE PACKING COMPANY**

# THE SKY'S THE LIMIT IN SAVINGS WHEN YOU *Roto-Finish* PRECISION PARTS



Tedious, hand or semi-mechanical finishing of precision parts takes time . . . costs money. With the original Roto-Finish process, using Roto-Finish machines, chips and compounds, one man can finish hundreds of parts at one time . . . to exact tolerances. The illustrated parts show the diversity in size, shape and material in the parts that are now precision finished by the Roto-Finish process.

To determine your requirements Roto-Finish maintains a completely equipped laboratory which can (and does) process parts to your specifications. The results we obtain are guaranteed to be duplicated in your plant. This sample processing service is yours without obligation. Just send a few unfinished parts . . . along with a finished part as a guide, for prompt recommendation of the correct Roto-Finish process that exactly fits your requirements.

*write for fast-packed Catalog*

Inquire about Roto-Finish Special Machines and Equipment for specific applications.

## *Roto-Finish*

associated with The Sturgis Products Co.  
3713 MILHAM ROAD, KALAMAZOO, MICH.



## COMPANY

P. O. Box 958—  
Phone 3-5578

FOREIGN REPRESENTATIVES: CANADA — Windsor — Roto-Finish Canada Limited • ENGLAND — London — Roto-Finish Limited — 39 Park Street — Mayfair • AUSTRALIA — Melbourne — A. Flavell Pty. Ltd. • HOLLAND — Delft — N. V. Roto-Finish Maatschappij — Rotterdamse — WEG 370A • AUSTRIA, GERMANY, SWITZERLAND — Frankfurt a.M. — Metallgesellschaft A.G., Germany • ITALY — Milan — Società Roto-Finish a R.L. — Sesto S. Giovanni — Viale E. Marelli 31 • FRANCE — Paris — Societe Roto-Finish, 70 rue de la Republique-Puteaux (Seine) • BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formas Werco, Ltda.



A flight simulator designed to increase the safety and speed of training jet bomber pilots is equipped with 700 electronic tubes (equivalent to 110 table-model radios), 250 transformers, 250 relays, 200 toggle switches, and enough wire to fit out 85 four-room houses.

More than five million man-hours are required to build tools and special parts for production of a new jet aircraft.

It is estimated that there are roughly 12 billion lb of magnesium in a cubic mile of sea water.

The United States in 1952 was the largest importer and user of platinum and palladium.

Automobile dealers provided more than 6000 new passenger cars for high school driver training programs in 1952.

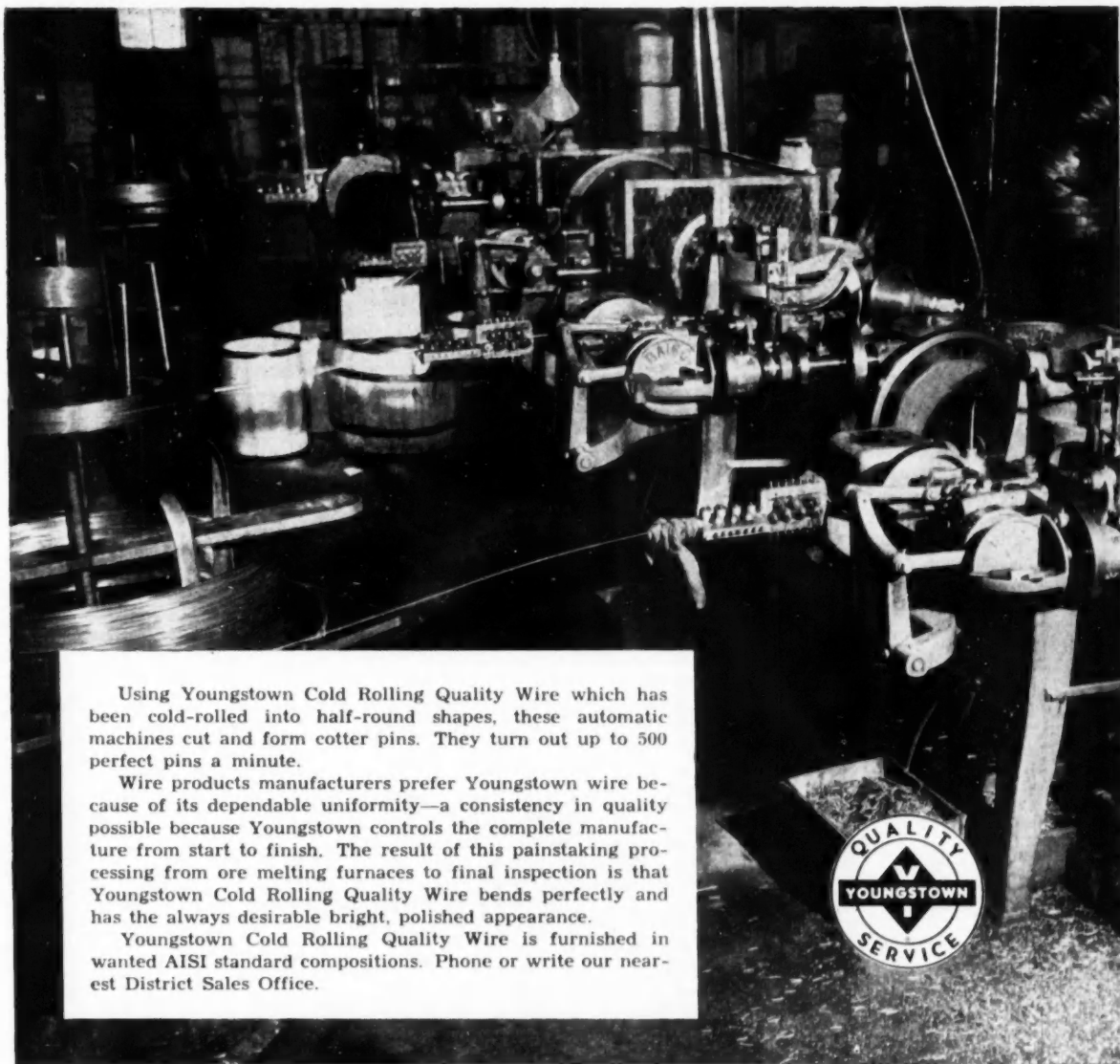
In 1900, all of the hard-surfaced roads in the United States would not have reached from New York to Boston.

Today's automobiles require up to seven miles of wire for their electrical systems, with more than 8300 parts forming as many as 180 different electrical assemblies.

To overcome effects of air friction at high speeds, a refrigerating system in a modern jet fighter must have a freezing capacity equal to 176,000 ice cubes a day.

A plane that will do 600 mph with an 11,000-hp engine would need 67,000 hp to fly 1000 mph.

# 500 PERFECT COTTER PINS A MINUTE WITH PERFECT-BENDING YOUNGSTOWN WIRE



Using Youngstown Cold Rolling Quality Wire which has been cold-rolled into half-round shapes, these automatic machines cut and form cotter pins. They turn out up to 500 perfect pins a minute.

Wire products manufacturers prefer Youngstown wire because of its dependable uniformity—a consistency in quality possible because Youngstown controls the complete manufacture from start to finish. The result of this painstaking processing from ore melting furnaces to final inspection is that Youngstown Cold Rolling Quality Wire bends perfectly and has the always desirable bright, polished appearance.

Youngstown Cold Rolling Quality Wire is furnished in wanted AISI standard compositions. Phone or write our nearest District Sales Office.



# Youngstown

**COLD ROLLING  
QUALITY WIRE**

## THE YOUNGSTOWN SHEET AND TUBE COMPANY

*Manufacturers of  
Carbon, Alloy and Incoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS -  
SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIRES

## Industries Given Impetus By Automotive Production Advances

(Continued from page 33)

### Cutting Tools

Consider special cutting tool materials such as the cemented-carbides. First exploited commercially toward the end of 1928, the cost of the basic materials was so high that an expansion of the industry had to wait until it was supported by a large volume-

using industry. It was only logical that the automotive industries should pioneer and lead in this field. But again it was the large volume of consumption of c-t-c tooling made possible by the largest chip producing industries in the world that gave the cutting tool producers a market and

an incentive. Today practically all metalworking industries can enjoy the benefits of modern cutting tools.

### Powder Metallurgy

The same can be said of powder metallurgy. Powder metallurgy has been in business for many, many years. But it required acceptance by the automotive industries as well as the impetus of the war program to bring the art to real fruition as a mass producer. Moreover, the larger volume of business thus guaranteed made it possible to spend large sums for research and development for the benefit of everyone concerned.

From extremely modest beginnings powder metallurgy now extends to the gamut of commercial engineering materials, including materials too hard to machine, and ferrous alloys capable of being heat treated and hardened. Some impression of the rise of this industry may be gained from the fact that in 1950 some 1-million lb of iron powder were produced in the U. S. It has been estimated that before the end of this year, the industry will be producing at the rate of 7-million lb a month.

### Light Metals

Surely we can say the same thing about light metals — aluminum and magnesium. When freed from the restrictions of the defense program there will be a still wider use of rolled and extruded shapes and sheet for building truck and trailer bodies, and mobile homes. Current developments on the part of leading producers in this field will necessarily encourage a wider use of aluminum and magnesium in the form of forgings, sand castings, die castings, etc., for the structural elements of motor cars, trucks, and buses.

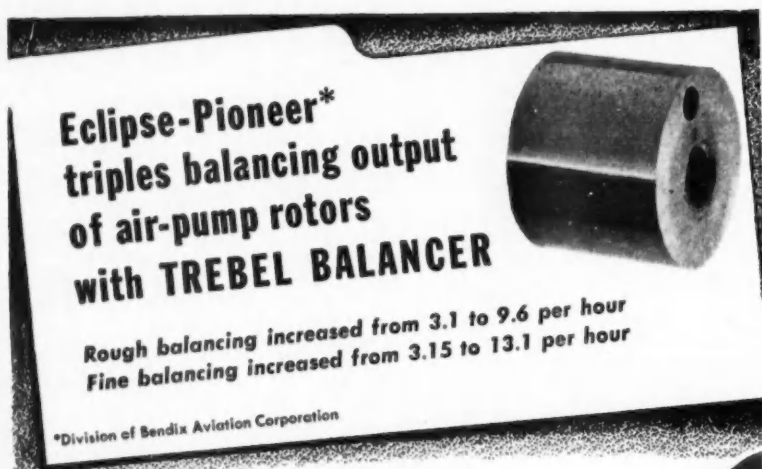
### Die Castings

The die casting industry is another that was encouraged in its growth by the vast requirements of the automotive industries. It goes back many years to the development of zinc die castings. For years enormous tonnages were consumed for hardware, small parts, decorative parts, and relatively big radiator grilles.

### Alloy Steels

The development and wide use of alloy steels is acknowledged to stem from automotive needs for high strength parts. And certainly the industry is the major consumer of quality sheet for bodies and other stampings.

(Turn to page 126, please)



**Eclipse-Pioneer\***  
triples balancing output  
of air-pump rotors  
with TREBEL BALANCER

Rough balancing increased from 3.1 to 9.6 per hour  
Fine balancing increased from 3.15 to 13.1 per hour

\*Division of Bendix Aviation Corporation

### Locate unbalance in your rotating parts this fast, simple way

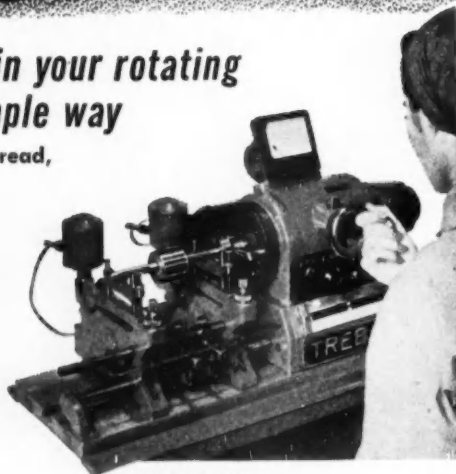
Takes less than a minute to read,  
2 minutes to set up.

No special skills are needed to detect the unbalance that causes vibration in rotating parts . . . when you use the TREBEL DYNAMIC BALANCER.

The unique TREBEL dynamic balancing principle applies a variable counter-vibration to counteract unbalance vibration. Direct readings in ounce-inches give the amount of unbalance without further calibration; readings in degrees show location of unbalance.

That's why so many leading plants use the TREBEL.

Write for Catalog "B" or see a demonstration in your own plant.



Model 2bS Trebel Balancer  
Weight capacity 2½ oz. to 4½ lbs.  
Max. work diameter 7"; length 18"  
Accurate within .000025" displacement of center of gravity  
Other Trebel models for work up to 22,000 lbs. and 98½" Ø.

**KO KURT ORBAN**  
COMPANY, INC.

205 East 42nd St., N. Y. 17 • Offices in Cleveland, Detroit, Los Angeles, San Francisco, Houston  
Canadian sales by European Machinery Ltd., 11 King St. West, Toronto, Canada.





## ANOTHER FAMOUS ENGINE BUILDER THAT USES THOMPSON VALVES

Where the load is heavy . . . or the service is tough  
and continuous . . . you're likely to see a LeRoi  
engine . . . equipped with Thompson Valves.

LeRoi is another one of the leading engine builders  
who depend on Thompson to develop and supply  
valves that will meet all the conditions that LeRoi-  
powered equipment encounters around the world.

Take a tip from LeRoi and other leading engine  
builders . . . count on Thompson for engineering  
leadership.

VALVE DIVISION

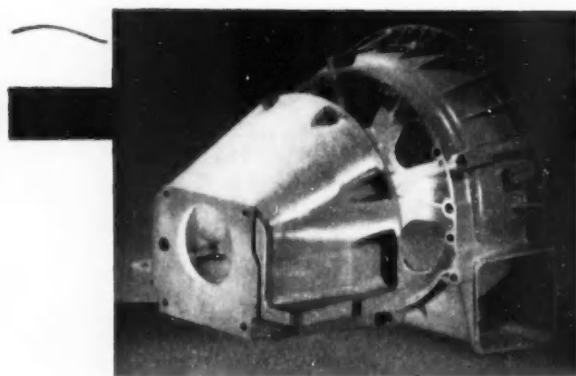
### Thompson Products, Inc.

DEPT. VG-10 • CLEVELAND 17, OHIO





## How Doehler-Jarvis halve the weight and



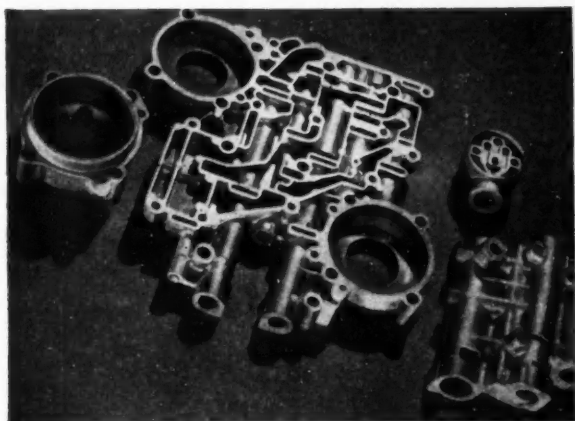
These torque converter and clutch housings are light, sound and strong. They withstand great vibrational stresses and the jarring and jouncing encountered in endless miles of "shift-free" motoring. As cast by Doehler-Jarvis, these housings provide many economies in machining costs. For one example, the long oil holes in the torque converter housing are cast-in.



Your motor car dollar buys a whale of a lot more performance than it did a few short years ago. Why? Because it pays for less dead weight and more useful horsepower. It pays for fewer heavy, slow-production parts and buys more lightweight, high-speed, precision-made units. It pays for fewer laborious fabrication steps and buys more streamlined assemblies of formed-to-fit parts.

As a case in point, consider the automatic transmission. It has become progressively more efficient, lighter in weight, part for part — and less expensive to own and operate.

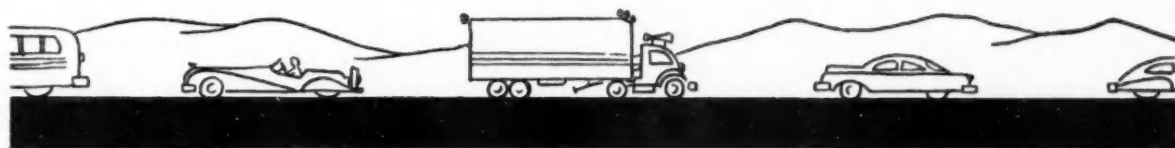
These improvements have been made possible to a great extent by the use of die cast parts, many of which are produced by Doehler-Jarvis in close cooperation with motor car makers.



Valve castings used in an automatic transmission. These parts are among the most intricate of the multitude of die castings made by Doehler-Jarvis. Obviously extreme dimensional accuracy is required for proper fit and functioning of all valve components.

## Helped Motor Car Makers

# lower the cost of heavy duty housings



A prime example of this teamwork between the customer's design and engineering staffs and those of Doehler-Jarvis is the set of housings — torque converter and clutch — illustrated.

These are truly heavy duty parts. Before Doehler-Jarvis entered the picture they weighed together about 50 pounds and required considerable working-over and machining prior to assembly. The Doehler-Jarvis aluminum housings weigh about 23 pounds and require a minimum of handling before assembly.

This is but one example of how the Doehler-Jarvis organization, with resources and resourcefulness developed during a half century of die casting, works hand-in-hand with makers of metal products—in the automotive, household appliance,

office machine, electrical merchandise and many other important industries.

Call in Doehler-Jarvis when you are faced with problems in the design and procurement of lighter weight, lower cost, more efficient metal parts.

**Doehler-Jarvis  
Division**  
of  
**National Lead Company**

General Offices: Toledo 1, Ohio



\*Reg. U. S. Pat. Off.



## TUBELESS MAGNETIC AMPLIFIER DC SUPPLIES

*for Automotive  
and Aircraft Industries*

Sorensen Nobatrons Model MA6/15 and Model MA2850 are tubeless — using magnetic amplifier principles. They have plenty of current capacity — 100 amps at 6 volts or 75 amps at 12 volts in the MA6/15 and 50 amps at 28 volts in the MA2850. Please see the specs below.

The MA6/15 is designed primarily as an automotive production test instrument for use in checking window motors, heaters, clocks, radios, headlight dimmers, ignition systems, air conditioners, cigarette lighters. The MA2850 can be used for testing aircraft heaters, pitch changers, inverters, radar, fire control systems, etc. Built around tubeless circuits, both models are carefully engineered and built to give you years of trouble-free, dependable service. Write for information now!

# SORENSEN

SORENSEN AND COMPANY, 375 Fairfield Ave., Stamford 9, Conn.

### SPECIFICATIONS

#### Model MA2850

Input voltage range	190-230, 3 $\phi$ , 4 wire, 60 ~
Output	28 volts DC, adjustable between 23 and 36 volts
Current	0 - 50 amperes
Ripple	3% max RMS
Regulation accuracy	$\pm 1\%$ against line and load combined
Time constant	0.5 seconds under worst conditions
Dimensions	15 $\frac{1}{2}$ " wide x 25 $\frac{1}{8}$ " high x 13" deep

Meters are standard.  
Units are self contained.

#### Model MA6/15

Input voltage range	210-250 VAC, 1 $\phi$ , 60 ~
Output	Adjustable 6 - 7.7 volts DC from 0-100 amperes Adjustable 12 - 15.4 volts DC from 0-75 amperes
Ripple	1% max RMS
Regulation accuracy	$\pm 1\%$ against line and load combined
Time constant	0.2 seconds under worst conditions
Dimensions	21" wide x 36" high x 15" deep

Meters are standard. Cabinets optional.

## Automotive Production Advances

(Continued from page 122)

### Plastics

Perhaps the most recent industry to find its major market here is the plastics industry. In recent years this activity has been greatly expanded by the emergence of fibers, particularly glass, and the formulation of glass with plastics to provide enormously increased structural properties. The current interest in sports cars surely will give plastics a tremendous boost, particularly if there is no change in the plans of the large producers. And special formulations should be booming with a greater extension of the practice of making short-run dies of plastics.

### Shell Molding

Nor is this the whole story. Shell molding, of which much has been written during the past few years, shows unquestioned promise of revolutionizing foundry practice and with it, metal cutting practice. Many foundries are already using the process and others are engaged in experimental studies. By far the largest operation is at Ford and one of these days we shall be able to tell the real story. At this writing, however, it is significant that resins plastics for shell molding are being consumed by the million lb.

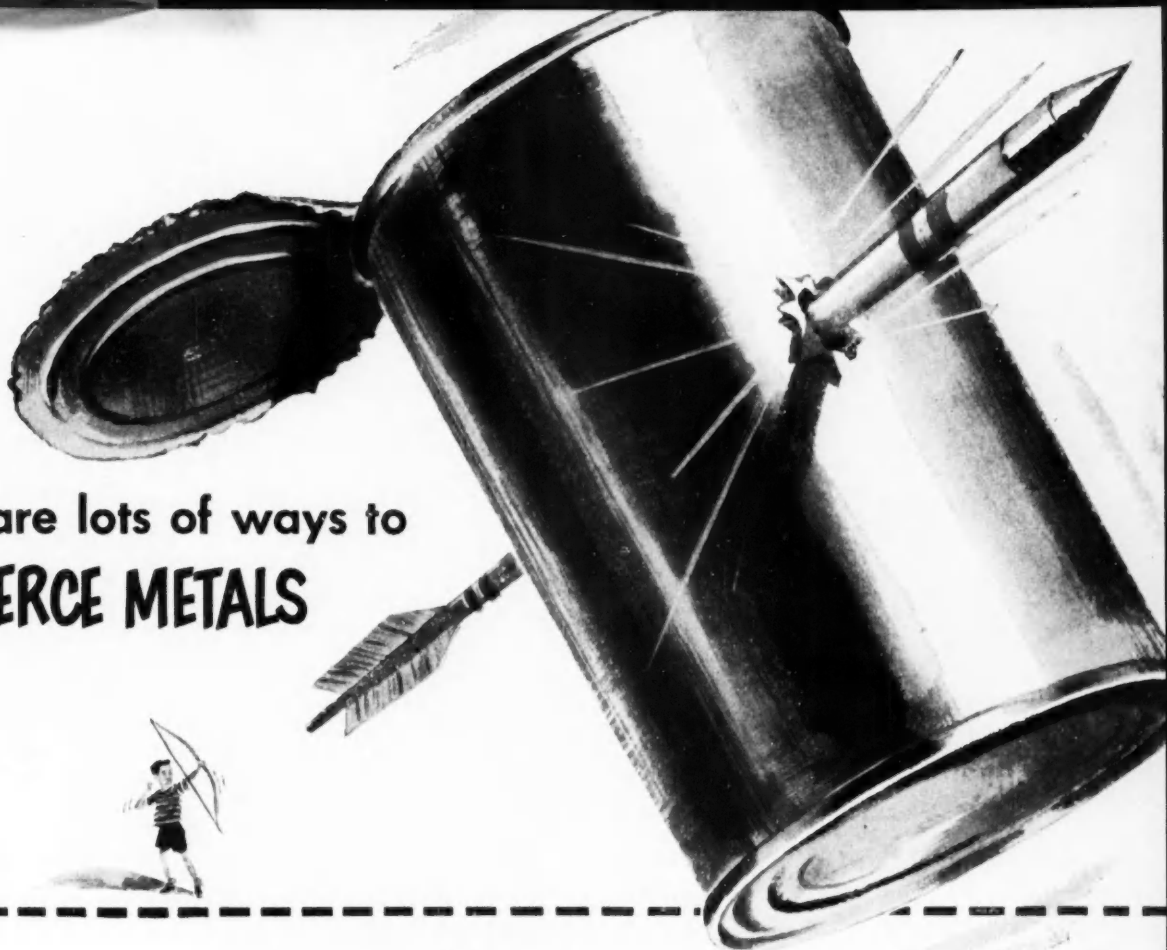
## BOOKS...

A COMPANY GUIDE TO EFFECTIVE STOCKHOLDER RELATIONS, *edited by Elizabeth Marting, published by American Management Association, 530 W. 42nd St., New York 36, N. Y. Price, \$2.00.* This 60-page booklet is an authoritative manual of objectives and methods for ensuring a flow of accurate, complete company information to the financial community and the investing public. Written by a group of security analysts with contributions by corporate executives and regulatory agency representatives, it covers the subject of stockholder relations from the viewpoint of the investor-owned corporation, with attention to the role of the security analyst and the implications of federal law.

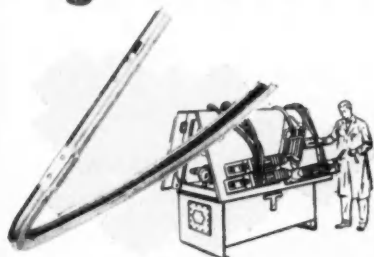
TECHNIQUES OF PLANT MAINTENANCE, *published by Clapp & Poliak, Inc., 541 Madison Ave., New York 17, N. Y. Price, \$6.00.* Incorporated in this 288-page volume are the texts of 61 sessions on various aspects of maintenance and plant engineering held in Cleveland in January. Highlight is the publication of 859 questions and answers at the general and sectional conferences. Thousands of other questions and discussions are summarized in narrative style.



There are lots of ways to  
**PIERCE METALS**



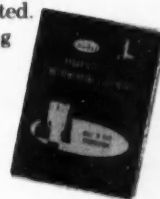
But here's  
**High Production Piercing in a single set-up**



Seven irregular holes and two trimming operations complete this car door inner window frame in one setup. Model changes can be made at low cost.

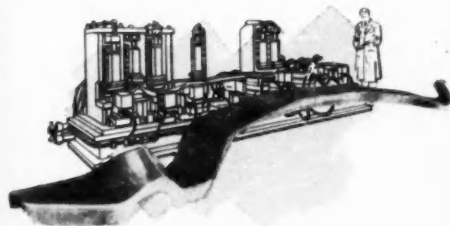
**DANLY HYDRAULIC METALWORKING EQUIPMENT**

Now you can pierce multiple holes of practically any type—round, oblong or irregular—to very close tolerances in a single setup. Capacity of Danly Metalworking Equipment can be as high as 225 tons per hole with break-through shock practically eliminated. Each station hydraulically strips its punch, greatly simplifying fixturing. Custom-built for your piece part, Danly Hydraulic Metalworking Equipment enables you to pierce more holes faster and more accurately—in one operation. Write for the special bulletin shown at right today.



**DANLY MACHINE SPECIALTIES, INC.**

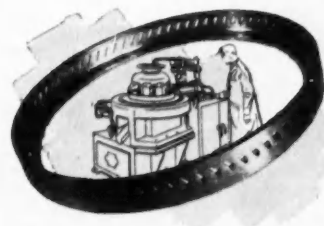
2100 South Laramie Avenue, Chicago 50, Illinois



More than 40 holes in this automotive frame member are pierced simultaneously on a Danly machine built expressly for this purpose.

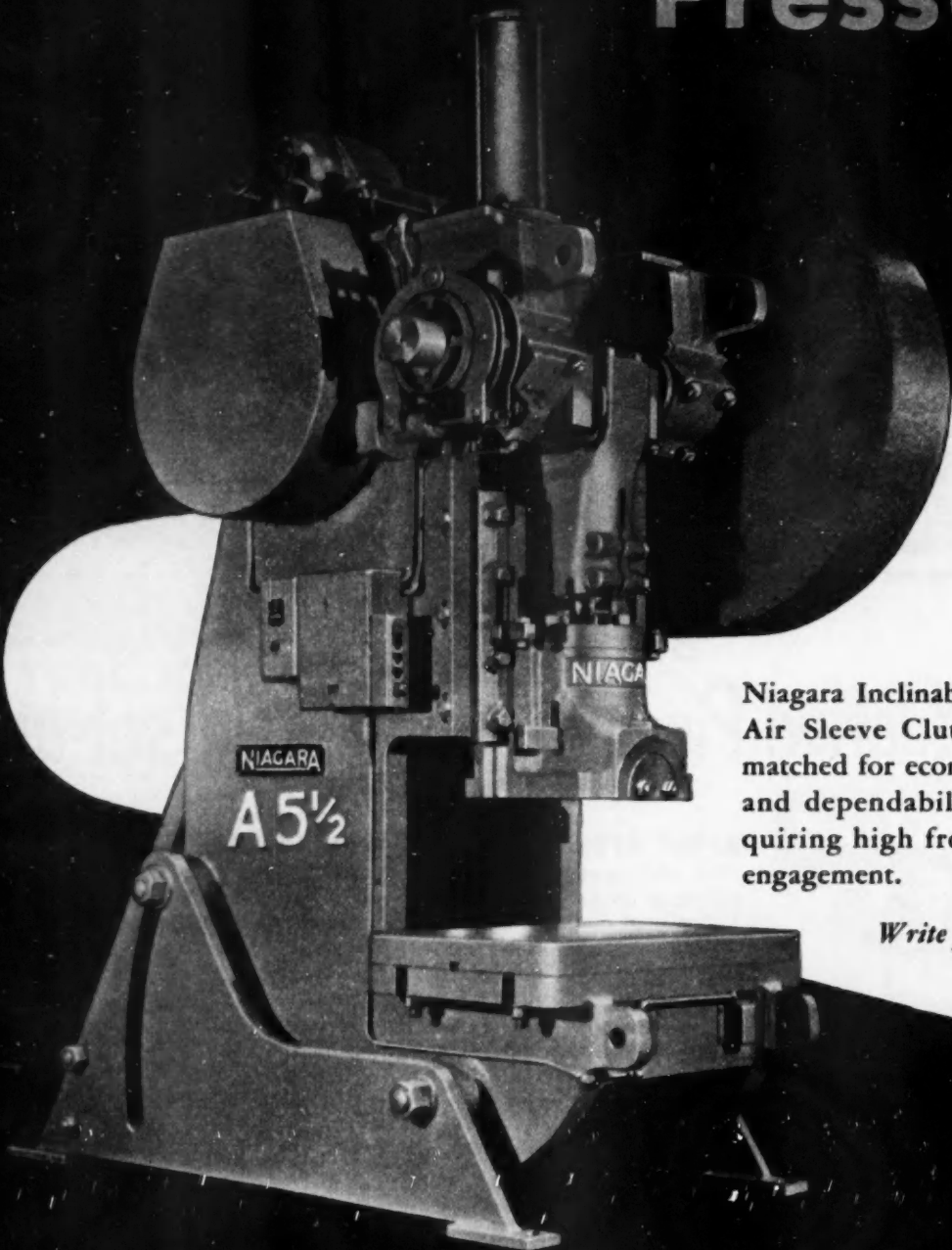


HYDRAULIC METALWORKING EQUIPMENT  
MECHANICAL PRESSES  
... 50 TO 3000 TONS



Irregularly shaped holes are pierced in this stainless steel jet engine part to very close tolerances—automatically.

# NIAGARA Inclinable Presses



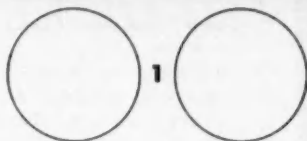
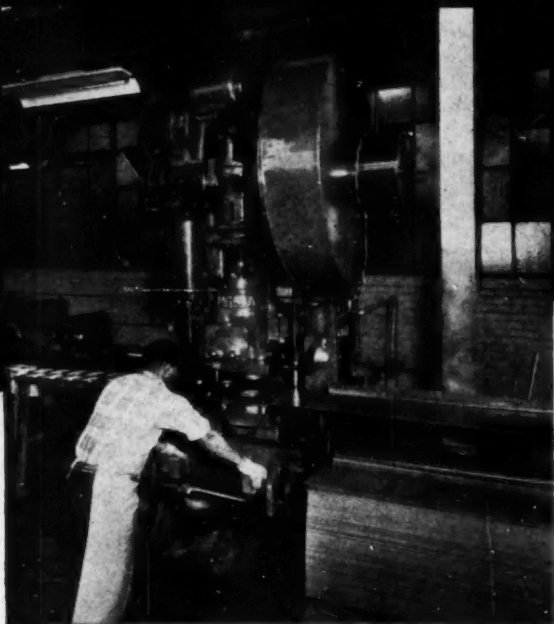
Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

*Write for information.*

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

# On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT



1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.



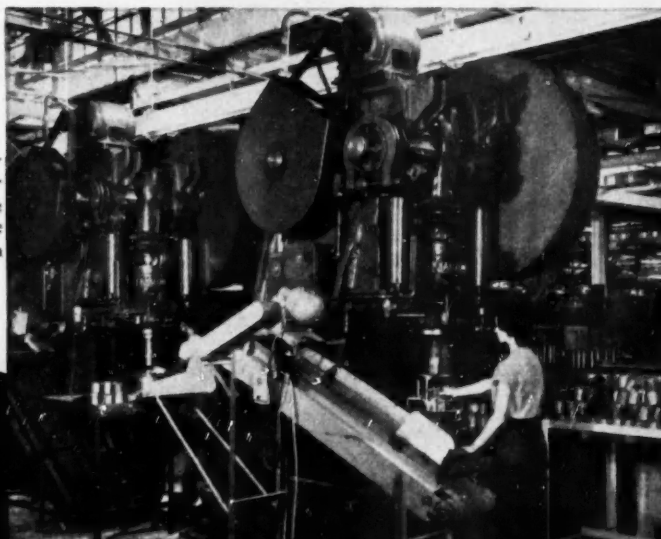
2, 3. Cupping and Re-drawing on A-5½ Presses with Air Sleeve Clutches.



4, 5, 6, 7. Indenting end on A-3½ Presses.



8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

## NIAGARA

*America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work*

**DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA**

*Dealers in principal U. S. cities and major foreign countries*

# New Defense Facilities

**S**UPPLEMENTING the list of Certificates of Necessity issued up to August 10, 1953, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the September 15 issue, page 126, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Defense Production

Administration, August 10, 1953, to September 21, 1953.

Included in this latest tabulation, 18,037 new or expanded defense facilities of all types have been authorized for rapid tax write-offs, the total amount eligible for amortization, being \$28,118,830,000. These figures are exclusive of cases that are up for later review but included in this list

—in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-offs.

## — A —

**Aluminum Company of America (Cleveland Works), Cleveland, Ohio**

Aluminum forgings—\$4,000,000 (65)

## — B —

**Bendix Aviation Corp., Bendix Products Div., Mishawaka, Indiana**

Ordnance—\$117,432 (40)

**Bendix Aviation Corp., Bendix Radio Div., Towson, Maryland**

Aircraft radio & radar equipment—\$29,425 (65)

**Bendix Aviation Corp. (Red Bank Div.) Eatontown, New Jersey**

Miniature motors and other electrical equipment for defense—\$45,000 (40)

**R. H. Bouligny, Inc., Mecklenburg Co., N. C.**

Ordnance—\$225,800 (45)

**William Brewer Mach. Company, Hartford, Conn.**

Ordnance—\$1,828 (70)

## — C —

**Casco Products Corp., Bridgeport, Conn.**

Ordnance parts—\$77,148 (65)

**Continental Aviation & Engineering Corp., Detroit, Michigan**

Research and development for aircraft—\$928,599 (50)

**Cooper Tire and Rubber Company, Findlay, Ohio**

Rubber pontoons—\$82,995 (40)

**The Cornelius Company, Columbia Heights, Minnesota**

Aircraft parts—\$9,389 (45)

## — F —

**Fairchild Engine & Airplane Corp., Fairchild Guided Missile Div., Wyandanch, L. I., New York**

Aircraft parts—\$12,119 (65)

## — G —

**General Electric Company, Schenectady, New York**

Production-testing facilities for power equipment — \$1,036,830 (50)

**General Metals Corp., Adel Div., Burbank, Calif.**

Aircraft parts—\$57,035 (65)

Aircraft parts—\$144,372 (65)

**The Goodyear Tire and Rubber Co., Akron, Ohio**

Developing and testing of airplane tires—\$586,000 (70)

(Turn to page 132, please)

*The Pioneer*

**GABRIEL**  
SHOCK  
ABSORBERS





**Inbuilt** characteristics make

# **MORaine** friction materials

useful to many industries!

Notable characteristics of Moraine friction materials include their ability to resist heat over a wide temperature range, and their ability to resist wear over long periods of use . . . made possible by the uniform dispersion of non-metallic materials through the semi-metallic or metallic matrix. In some cases, for added strength and to increase the range of their applications, the materials are bonded to a steel support.

These characteristics are among the reasons why Moraine friction materials are so successful in automatic transmissions such as Powerglide, Hydra-Matic and Dynaflo, and equally successful in military vehicles and equipment, household appliances, and automatic truck transmissions. These applications should suggest other ways in which Moraine friction materials can be used to improve performance and cut costs.



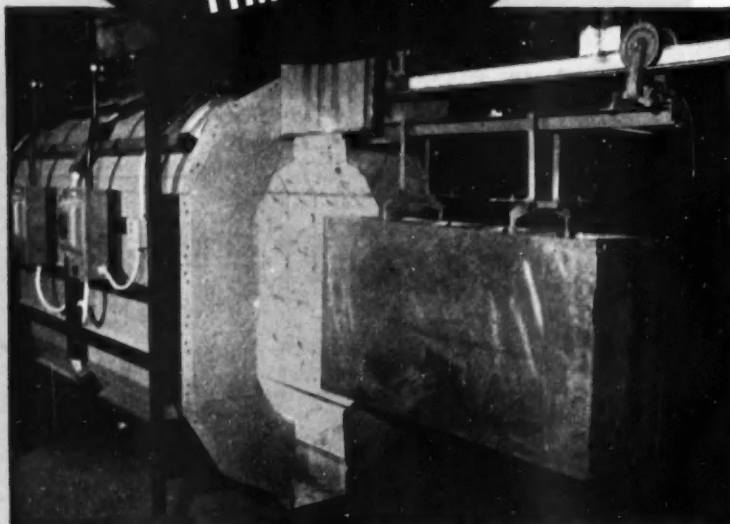
**moraine  
products**

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

# FOSTORIA

*America's Finest  
Engineered Ovens*

**SAVE SPACE •  
TIME • COSTS**



## A TYPICAL EXAMPLE OF ADVANTAGES TO THOUSANDS OF PLANTS

With a 14' 8" Fostoria oven, Anderson-Hickey Co., Nashville, Tenn., now bakes the finish on metal filing cabinets in 5½ minutes compared to 30 minutes previously required with another oven. Interior cabinet fittings, which were formerly baked separately, are now baked inside the cabinet. Improved quality of finish with uniform hardness and glass is now obtained.

Throughout industry, new high standards of efficiency are being set by utilization of modern Fostoria oven equipment. A Fostoria representative will gladly analyze your production needs and submit recommendations for your consideration.

Thoroughly proved production results in over 7,000 installations are the factual evidence that rates Fostoria the "Most Efficient of All Industrial Ovens". No other oven approaches Fostoria results in the high percentage of energy *usefully* utilized. No other oven compares with Fostoria in production per square foot of floor space. No other oven can match the quality of output or the low "per piece" cost of the high efficiency Fostoria oven. Give your plant the benefit of this modern, cost-cutting, quality improvement, space-saving equipment. Write now for complete facts.

● Visit our display of Paint Heating and Infra-red Systems at the PAINT INDUSTRY SHOW, Atlantic City, BOOTHS NO. 85-86

**INFRA-RED**  
**fostoria**  
**OVENS**

THE FOSTORIA PRESSED STEEL CORP.  
FOSTORIA, OHIO, Dept. I

Please send me information on Infra-red Ovens for .....

Name .....

Company .....

Street .....

City ..... State .....

**MOST EFFICIENT OF ALL INDUSTRIAL OVENS**

(Continued from page 130)

The Goodyear Tire and Rubber Co.,  
Akron, Ohio  
Developing and testing of airplane  
tires—\$586,000 (70)

— H —

Hydro-Aire, Inc., Burbank, Calif.  
Aircraft accessories—\$228,393 (65)

— I —

Island Machine Company, Inc., Farm-  
ingdale, New York  
Machining of aircraft parts—\$26,-  
443 (70)

— J —

Jefferson Engineering & Manufactur-  
ing Co., Detroit, Michigan  
Ordnance—\$58,506 (70)

— L —

Link Aviation, Inc., Binghamton, New  
York  
Aircraft parts—\$324,000 (60)

— Mc —

McDonnell Aircraft Corp., St. Louis,  
Missouri  
Aircraft—\$308,060 (40)  
Aircraft—\$856,900 (60)

— N —

National Brass Company, Grand Rap-  
ids, Michigan  
Ordnance—\$55,500 (70)  
W. H. Nichols Company, Waltham,  
Massachusetts  
Aircraft parts—\$34,350 (65)

— O —

O & M Machine Co., Inc., Los An-  
geles, Calif.  
Aircraft parts—\$236,993 (70)

— P —

Protair Corporation, Los Angeles,  
Calif.  
Aircraft parts—\$35,989 (70)

— R —

The Ryan Aeronautical Company,  
San Diego, Calif.  
Aircraft parts—\$9,889 (65)

— S —

Saffran Engineering Co., St. Clair  
Shores, Michigan  
Aircraft parts—\$767 (70)  
Solar Manufacturing Corp., Vernon,  
Calif.  
Ordnance—\$600,000 (45)  
(Turn to page 134, please)



## the final *check* for every rotating part...

Maybe it's a crankshaft or an armature... perhaps a fan or a belt pulley. No matter. The important thing is this: If it isn't *balanced*, it isn't ready for service.

Smooth operation and long life require that accurate static and dynamic balance be rated right along with mechanical specifications... incorporated in the blueprints. Then, no vibration, however slight, may lower the efficiency of the finished product.

Gisholt Balancing Machines can locate and measure unbalance vibrations down to .000025" with simple readings... handle any assembly from 1/2 ounce to 50 tons.

The cost? Very moderate. That's why so many manufacturers insist that their products have the final check which only Gisholt Balancing Machines can provide.

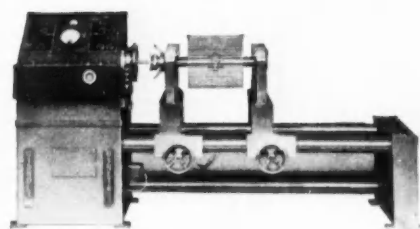
**THE GISHOLT ROUND TABLE** represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.



# GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin



The Gisholt Type 3U Balancer shown here is capable of balancing rotating parts or assemblies weighing from 50 to 1000 pounds. Other sizes and types are available to answer any balancing problem. Gisholt Balancers can also be furnished with correction equipment to meet your own specific requirements.

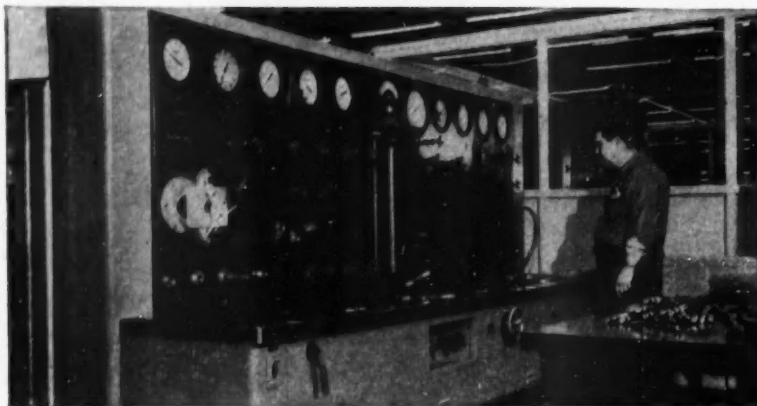
**DYNETRIC  
BALANCERS**



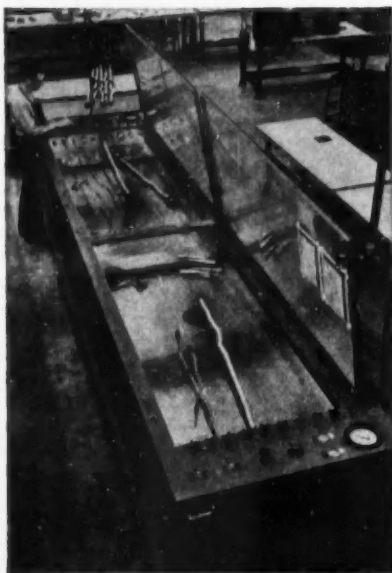
DEVELOPED JOINTLY WITH  
WESTINGHOUSE ELECTRIC CORPORATION  
"DYNETRIC" IS A TRADE MARK  
REG. U. S. PAT. OFFICE BY  
WESTINGHOUSE ELECTRIC CORPORATION

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

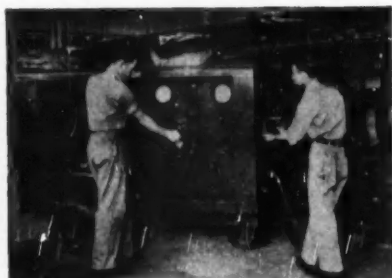
## GREER TOPICS Important News of Aviation & Industrial Test Equipment



Greer Stationary Hydraulic Accessories Test Stand, shown here in Ford's Kansas City Aircraft plant, provides a shop type machine to fully check hydraulic system accessories including system pump at flow rates up to 20gpm and at pressures up to 3400psi.



Greer Dual Hose Tester, used for B-47 hose lines, checks from one to six hose lines or similar production components with pressures to 25,000psi in covered burst chamber.



Greer Portable Hydraulic Test Machine provides hydraulic test fluid for checking hydraulic systems of modern aircraft. Handles flows up to 20 gpm and pressures up to 3400psi.

**Greer Hydraulics Inc. 442 Eighteenth Street, Brooklyn 15, New York**

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio  
2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities

## How Greer Helps Ford

**Greer Test Machines check complex B-47 components at Ford's Kansas City plant**

This year is the fiftieth anniversary of the Ford Motor Company. Their entire history is one of quality products, economically produced. One of the reasons for Ford's extraordinary record has been its high standards of quality control.

To help maintain these high standards in the manufacture of aircraft components, Greer test equipment is at work in Ford's Kansas City aircraft plant. Complex B-47 components are put through rigorous inspection to determine their air-worthiness.

Walk into virtually any plant in the aircraft industry and you'll find Greer equipment at work. Most of the units are standard equipment ordered directly out of a catalog (yours on request). Other units were specially built to out-of-ordinary specifications by the famous Greer engineering department. These men are ready to go to work for you.



(Continued from page 132)

**The Steel Products Engineering Co.,**  
Springfield, Ohio  
Ordnance—\$390,858 (65)

— U —

**United Aircraft Corp., Sikorsky Aircraft Div.,** Bridgeport, Conn.  
Helicopter and parts—\$17,500,000 (75)

— W —

**The Williamson Heater Company,** Cincinnati, Ohio  
Components of military vehicles  
—\$68,298 (60)

## BOOKS...

**BUSINESS FORECASTING (Principles and Practice)**, by Frank D. Newbury, published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. Price, \$5.00. In this book business forecasting is presented as a practical management tool. Its value in planning investments, budgets, production schedules, merchandising campaigns, etc., is made clear by a businessman fully familiar with its present-day application. The book discusses the principles and practices of organized forecasting—as opposed to "hunch" forecasting, based on guess or intuition. It shows how to set up and organize effective forecasting activities in a company for better-informed management decisions. The fundamental economic principles upon which accurate forecasting depends—such as the relationship between spending and the level of business activity, the status of investment spending, and the relationship of monetary factors to business activity and price level—are carefully explained. Methods for forecasting national production and national income are presented in detail. Forecasting by the extension of past experience is covered by descriptions of the projection of trends, by correlations, and by the analysis of business cycles. Business cycles are treated as special cases of business fluctuations, regarding different industries as separate from the general business picture. The last three chapters deal with the forecasting of the Federal Reserve Index of production, prices, and sales.

**SERVICING GUIDE TO BRITISH MOTOR VEHICLES**, by J. N. McHattie, VOLUME TWO, published by Trader Publishing Co., Ltd., London, England. Copies available from Auto Books, 2708 Magnolia Blvd., Burbank, Calif. Price, \$10.50. Following up the first volume of this servicing guide, Vol. 2 has been produced to bring the information up to date with particulars of 1951 and 1952 models. The book has been divided into three sections for cars, commercial vehicles and tractors. The data sheets which make up the volume are arranged in a standardized layout with sectional arrangement drawings of principal components, sketches and tabulated data of uniform style. Details of servicing operations, stressing unusual features of design, are given in telegraphic style in the text. Although primarily intended for the information of service men, the book should appeal also to students of design in the vehicle manufacturing industry, as it offers a ready means of comparison, on equal terms, of a wide variety of designs.



STAINLESS STEEL KITCHENWARE

# McLouth STAINLESS Steel

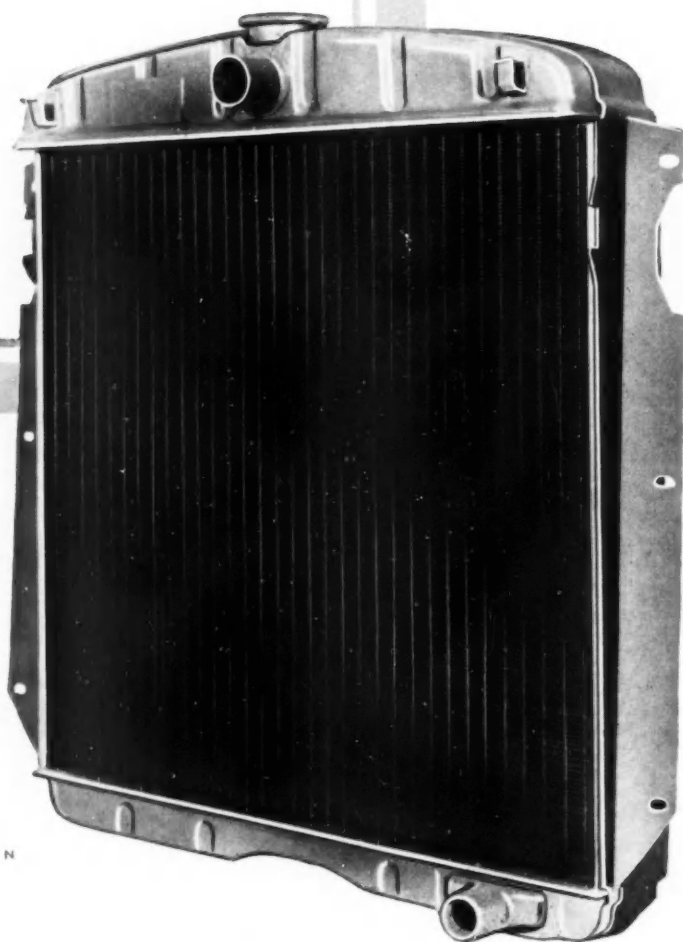
For the product you make  
today and the product you  
plan for tomorrow.



**McLOUTH STEEL CORPORATION**  
DETROIT, MICHIGAN

*Manufacturers of Stainless and Carbon Steels*

**An investment  
in good cooling**



**HARRISON  
RADIATOR  
DIVISION**

GENERAL MOTORS CORPORATION  
LOCKPORT, NEW YORK

***HAR/RISON***

## AIRBRIEFS

(Continued from page 88)

be used in the very near future. He addressed the 51st Annual Meeting of the National Petroleum Association in Atlantic City. General Doolittle is serving this year as Chairman of the National Committee, 50th Anniversary of Powered Flight.

### Dream Comes True

The long-awaited dream of proponents of "all first-class mail by air" is beginning to come true with the start of such service between New York and Chicago and Washington and Chicago. The Post Office Department, through the Civil Aeronautics Board, is now using American, Capital, TWA and United airlines to carry all first-class mail between these cities on the regular basis of 3¢ an ounce. However, first-class mail is being carried only on a "when capacity is available" basis and regular 6¢ airmail letters continue to receive their usual priorities. The PO Department will pay these carriers 18-20¢ per ton-mile for the first-class mail, compared to 45-53¢ per ton-mile for regular airmail (the lower figure is over the New York-Chicago route, the higher over the Washington-Chicago route). While it might be supposed that the tonnage of first-class mail between these cities would severely tax these airlines, a spokesman reveals that these airlines actually have unused capacity of about 100 tons daily between these cities and the first-class mail estimate is only about 30 tons daily. Proponents are predicting expansion of the idea to other cities during 1954 with an eventual goal of all first-class mail by air between cities of 100,000 or more. (First-class mail has traveled by air throughout Europe since shortly before World War II.—Ed.)

### Cutting Lead Time

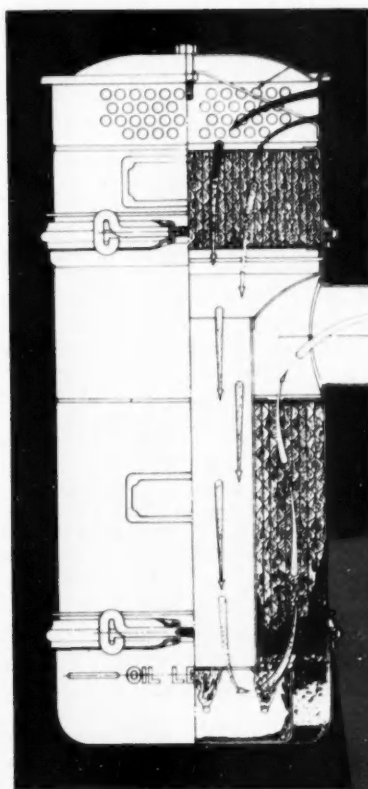
Aircraft Industries Association has offered several basic suggestions to the military services designed to speed production and cut costs. AIA's Director of Industry Planning, George F. Hannaum, believes that these objectives may be achieved by: removing the artificial separation between the design of the prototype airplane and its later redesign for production by allowing enough money in the beginning to finance complete design-for-production of prototype aircraft; allow the manufacturer to make minor

decisions on detail requirements of the airplane, such as equipment items, instead of requiring military approval for each such item; make funds available in advance for re-order of production airplanes so that "long lead time" items, such as landing gears, can be ordered well in advance of the actual re-order of the airplane as a whole by the military; standardize and simplify; and stabilize production through elimination of the "stop and start" types of procurement.

### Turboprop Headaches

The recent military and airline re-embrace of the turboprop engine as the next major engine type in the U. S. hardly squares with the recent Navy decision to abandon production on the Douglas A2D Skyshark carrier attack plane. Difficulties with the plane's turboprop engine, which have been continuous for nearly three years, were given as the reason for the move. The trusty AD

(Turn to page 141, please)



# PROVED and Approved

Leading compressor manufacturers specify Donaldson Air Cleaners

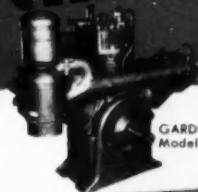
**DONALDSON**  
*Oil Washed*  
**AIR CLEANERS**

Proved in the laboratory and in the field, Donaldson Air Cleaners meet all the rigid requirements of air compressor applications. Practically all dust, including elusive "extra fines" is removed to reduce wear on compressor parts; and the oil-trapping upper condensing element reduces oil loss from cyclical "blow back" to a minimum.

Donaldson air compressor Air Cleaners are used extensively by leading manufacturers on units with a wide range of capacities. Write for specifications.

**DONALDSON CO., INC.**

666 Pelham Blvd., St. Paul 4, Minn.  
DONALDSON CO. (Canada) LTD., Chatham, Ontario  
GRINNELL DIVISION: Grinnell, Iowa



GARDNER-DENVER  
Model WXE-8029



JOY Model 630

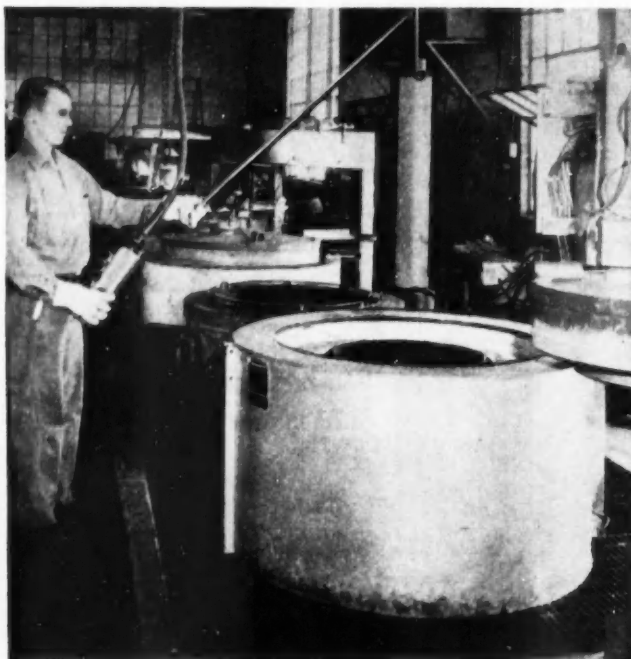


ACME  
Model 240-6R

# Donaldson AIR CLEANERS

# 4

## REPORTS ON MICROCARB® CONTROL... FROM PRODUCTION HEAT TREATS



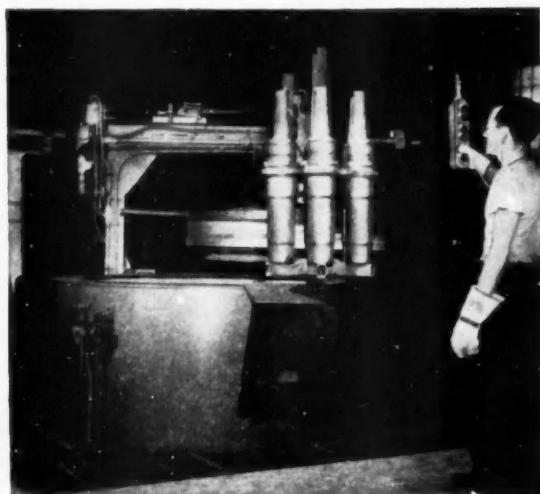
# 1

## TOLERANCES HELD

● This row of L&N furnaces is in the Heat Treating Department of Jones and Lamson, Springfield, Vt., manufacturers of turret and automatic lathes, thread grinders, comparators, dies and chasers. In the foreground is a Homocarb furnace with Microcarb Control—panels are against the wall at the right.

The part being removed is a work slide bar for a J&L Model D Vertical Slide Form Grinder. The bar is made from 5% chrome, 1% carbon air hardening steel. Specifications are 64 plus, in Rockwell C uniform surface hardness. These bars are ground to a  $\pm .0002$  inch tolerance on outside dimensions and zero on straightness and eccentricity and must remain stable. Control of surface carbon chemistry and distortion during heat treatment are extremely important.

● At right is an adjusting cone for the spring collet on a J&L Bar Type Turret Lathe. These cones are 8" in diameter by 5" deep with  $\frac{3}{8}$ " walls, and are



# 2

## DISTORTION NEGLECTIBLE

● Taft-Peirce in Woonsocket, R. I. installed their Homocarb® furnace with Microcarb Control to improve physical characteristics . . . particularly by maintaining surface carbon content during hardening of these aircraft "prop" shafts made of AMS 6415 steel. Each shaft measures 6 inches in diameter by 30 inches long and weighs 125 pounds.

Six shafts are run at once . . . loads are brought to 1550 F and held for 4 hours with a carbon setting of 0.45% . . . then oil quenched. The firm reports that specifications—for strength, elongation, reduction in area, etc.—are held without difficulty on every load; work comes out clean and distortion is negligible.

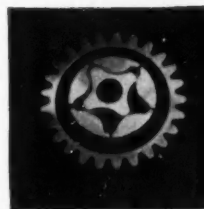


made from 5% chrome, 0.10% carbon air hardening carburizing steel. While machining and physical characteristics of this steel are excellent, it requires precise control of furnace atmosphere during carburizing to meet J&L's requirements for uniform surface hardness of 60 to 63 Rockwell C. J&L carburize these parts at 1750 F with Microcarb atmosphere control—air cool then stress relieve them in an L&N Homo Tempering furnace at 300 F. They report not only that they have no difficulty meeting specifications on individual loads, but can reproduce the same cycle time after time.





## 3 FINISHING REDUCED



● Just in front of the control panels is the 15" x 18" Homocarb furnace with Microcarb Control in which the W. H. Nichols Company, Waltham, Mass., heat treat aircraft gears like the one above. The gears, measuring 3½ inches in diameter, are made of AMS 6260 and 6274 nickel-chromium-molybdenum steel. Prescribed specifications call for a minimum 81 Rockwell "A" hardness, with a .025 to .040 case free of carbide network. The operator simply sets temperature control to 1650 F and carbon control to 0.90.

Nichols also uses this furnace to harden AISI 4140 steel pump shafts. The precise L&N control eliminates undesirable decarburizing or carburizing and substantially reduces successive finishing operations that were formerly necessary.

## 4 OPERATION AUTOMATIC

● These Homocarb furnaces with Microcarb Control are used for production-line carburizing and heat treating of Universal Joint spiders made by Warner Machine Products Inc. Twenty-four of the large spiders are loaded at a time. Material is SAE-8720 steel. The load is held at 1700 F to obtain a 0.090 inch case depth with the atmosphere controlled at 0.90% to 0.95% carbon. Parts are cooled in the furnace to about 1525 F then direct oil quenched. Warner obtains a hardness of about 63 Rockwell C.

Although none of the operating personnel in this Warner Machine Plant had ever had any experience in carburizing and heat treating prior to this installation, control is so automatic that some 800,000 pounds of work were run through Warner's four furnaces in the first few months without a single loss due to heat treatment.

### WHAT MICROCARB CONTROL CAN DO FOR YOU

With Microcarb Control you get:

- Uniform Controlled Atmosphere and Temperature
- Continuous Records of Carbon and Temperature

This means that:

**Heat Treat Superintendents** can accurately reproduce any heat treating cycle to exact specifications.

**Works Managers** can increase production per square foot of floor space.

**Metallurgists** can specify and get any cycle

within a carbon range of 0.15 to 1.15 and a temperature range of 1500 to 1750 F.

**Production Superintendents** can maintain a high continuous rate of quality production.

**Management** has proof of the quality of their product.

*The Homocarb Method with Microcarb Control is available to help you solve your heat treating problems as it is now doing in nearly a hundred plants. For more information just write us at 4966 Stenton Avenue, Phila. 44, Penna.*

**LEEDS**  **NORTHROP**  
instruments automatic controls • furnaces

# REZOLIN

# Introduces

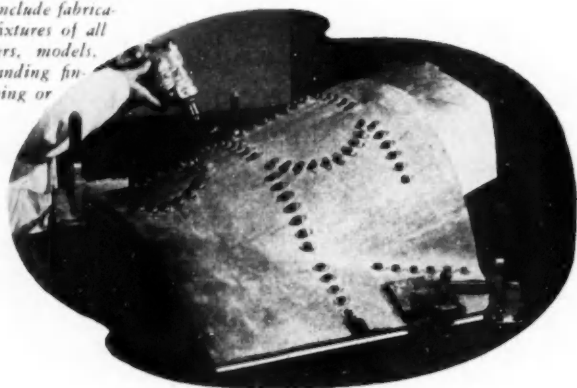
## TOOLPLASTIK L-900 LAMINATING RESINS

**New non-shrink laminating resins  
suitable for fabricating strong, accurate  
and easy-to-handle tooling**

Toolplastik L-900 and L-910—the first *non-shrink* laminating resins available to the tooling industry. Cost savings up to 50% over conventional tooling methods easily realized, not counting savings in time and labor.

No special equipment or facilities needed for these easy-to-apply and handle resins. Used in conjunction with glass fibre reinforcing, the new resins make many tooling applications a matter of days—not weeks or months. Design modifications and repairs easily made, too.

*Tooling applications of Toolplastik L-900 and L-910 include fabrication of jigs and fixtures of all types, tool masters, models, molds, etc. Outstanding finish without polishing or machining.*



To acquaint the tooling industry with its new line of laminating resins, Rezolin, Inc. has available a Laminating Pilot Production Kit. Contains everything needed to construct and evaluate a laminated tool. Send \$15.00 for postpaid kit, or write Dept. A for free information.

## Rezolin, Inc.

Serving Industry Since 1938

5736 W. 96th Street, Los Angeles 46, Calif.

Offices in Detroit—New York—Dallas

**REZOLIN  
TOOLPLASTIK**

AUTOMOTIVE INDUSTRIES, October 15, 1953

## AIRBRIEFS

(Continued from page 137)

Skyraider, which has been in production for six years, will be used to fill the Navy's requirements for the type. Although the A2D uses the Allison T40 dual unit, Pratt & Whitney has also withdrawn its T34 unit from the commercial market. Despite these U. S. difficulties, the British have had phenomenal success with their turboprop engines and these have given excellent military and airline service for five years. Meanwhile, rumors persist that Boeing has already received tentative orders from two airlines for its all-jet Model 707 transport. The "next engine" accolade is still awaiting award and the debate is now back in its familiar raging state among U. S. aviation experts.

### Backlog High

Despite budget and production cuts, the aircraft manufacturing industry currently has a backlog of orders on its books of \$18,940,000,000—easily the largest backlog of any industry in America (none other books orders so far in advance.) This figure is an increase of two per cent over the first quarter of the year and a whopping 32 per cent higher than the same period a year ago. As usual, these orders continue predominantly military with the Air Force and Navy accounting for 94 per cent of the aircraft, 97 per cent of the engines and 91 per cent of the propellers.

### Eight-Hour Day

American Airlines has announced an 8-hr. schedule for the New York-Los Angeles transcontinental non-stop service it will inaugurate Nov. 29, the fastest scheduled airline service in U. S. history. The company will use the new Douglas DC-7 transport for the service. The big, new transport will cruise at 360 mph carrying 67 passengers. On the West-bound flight, the actual clock time will be only five hours, permitting the New York passenger to have lunch in that city and dinner in Los Angeles. This is a miraculous performance and a fitting tribute in this 50th anniversary year of flight.

**AUTOMOTIVE INDUSTRIES**  
**Keeps You Informed**



Photo courtesy Sperry Gyroscope Company

## BOMBING RUN IN THE LABORATORY

### charted by Brush Oscillograph

On the analog computer, this engineer has duplicated flight conditions for a new jet plane making a bombing run on automatic pilot. Then he checks the performance of the system as charted by the six-channel Brush Oscillograph. Mission accomplished!

In many such exacting studies, immediate recording of electrical or mechanical phenomena by Brush Oscillographs saves engineering time and simplifies tests. These precision instruments give you answers in writing—of stress, strain, torque, vibration, pressure and other variables. They are available to suit your needs... from the single channel unit up to the six-channel size shown above.

Brush representatives are located throughout the U.S. In Canada: A. C. Wickman, Ltd., Toronto. For bulletin, write Brush Electronics Company, Dept. DD-10, 3405 Perkins Avenue, Cleveland 14, Ohio.

**BRUSH ELECTRONICS**

INDUSTRIAL AND RESEARCH INSTRUMENTS  
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES  
MAGNETIC RECORDING EQUIPMENT  
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**COMPANY**

formerly  
The Brush Development Co.  
Brush Electronics Company  
is an operating unit of  
Clevite Corporation



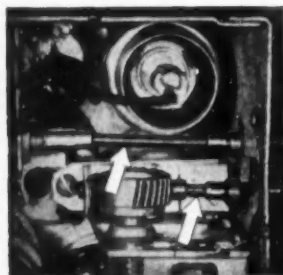
## THE PROBLEM

### ALIGNMENT, VIBRATION AND NOISE

A manufacturer of automobile radios had to provide a means of coupling the tuning and volume control knobs of the receiver with their respective circuit elements. In order to keep down manufacturing costs, the ideal control shaft would have to eliminate any problems of alignment, it had to dampen vibration and prevent noise caused by vibration from being communicated to the sensitive parts of the receiver circuit. For these reasons, the manufacturer chose —

## THE LOW-COST SOLUTION

### AN S.S. WHITE REMOTE CONTROL FLEXIBLE SHAFT



The flexible shafts **reduced assembly time and labor, eliminated alignment problems and provided 100% vibration-free performance.** In addition, it is apparent from the illustration that these coupling shafts give wide latitude in the placing of parts and make possible the most effective arrangement. It's savings

like these that make it well worth your while to investigate the economies of using S.S. White flexible shafts on your own remote control applications.

#### Valuable Flexible Shaft Information

*This 256-page flexible shaft handbook will be sent free if you request it on your business letterhead. It contains full facts and data on flexible shaft selection and application.*



**THE S.S. White INDUSTRIAL DIVISION**  
**DENTAL MFG. CO.**



Dept. B, 10 East 40th St.  
NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California

## Industry News

(Continued from page 90)

### Fixtures Moved in Jig Time

Fairchild Flying Boxcars now are moving down a new and improved final assembly line. The line was transferred from the company's former production area to a recently-completed assembly bay in less than a month at the Hagerstown, Md., plant.

While the move required numerous major plant changes and was executed during a period when Fairchild was facing its heaviest delivery schedules, C-119 production continued, uninterrupted, at the current rate. Transfer of the final assembly line is part of the \$9 million plant expansion and development program the Fairchild Aircraft Div. currently is concluding.

The transfer of lines necessitated relocation of the center-section and nacelle-mating fixture. The three parts were fastened together with steel girders and the assembly remained in place in the fixture. Overhead cranes carried the 17-ton loads about 300 ft, turned 180 deg, and lowered into position in the new line. Under conventional moving methods, this would have required nearly 300 man hours for realignment, and the jig would have been out of commission for five days. Only a few thousandths of an inch in alignment were lost, and after six hours of time and 40 manhours of work, the fixture was back in production.

### Avro Buys Plant

A. V. Roe Canada Ltd., Toronto, subsidiary of the British Hawker-Siddeley group of companies, bought the Orenda turbojet engine plant near Toronto from the Canadian government late in September for about \$17,500,000. Avro had been operating the plant, which was completed last year, on a management-fee basis, to make the Canadian-designed Orenda engine for the Avro CF-100 Canuck twin-jet fighter and the Canadian version of the F-86E Sabre fighter. A. V. Roe Canada Ltd., now has aircraft and engine manufacturing and research facilities at Malton, near Toronto, valued at about \$40 million.

### New Trico Plant

Trico Products Corp., will erect a research and engineering building near its plant in Buffalo, N. Y., at a cost of approximately \$250,000.





A wide variety of designs and sizes of sleeve bearings, cast bronze bushings, precision bronze parts, bi-metal and rolled split bushings, washers and spacer tubes. Research, engineering, quality control, large-volume production.

**FEDERAL-MOGUL CORPORATION**

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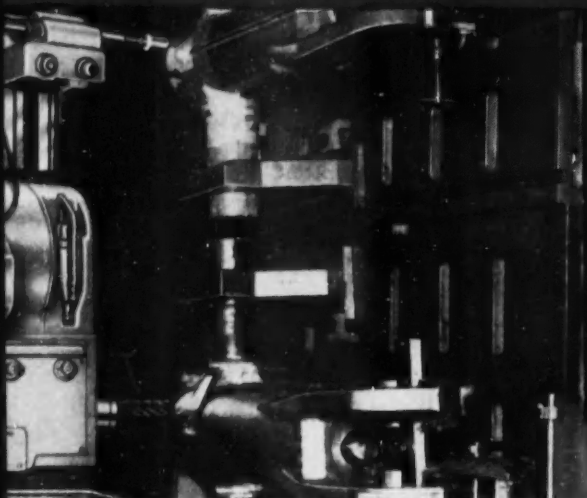
# FEDERAL-MOGUL

# **BEST** WAY TO MACHINE COMPLEX, IRREGULAR SHAPES

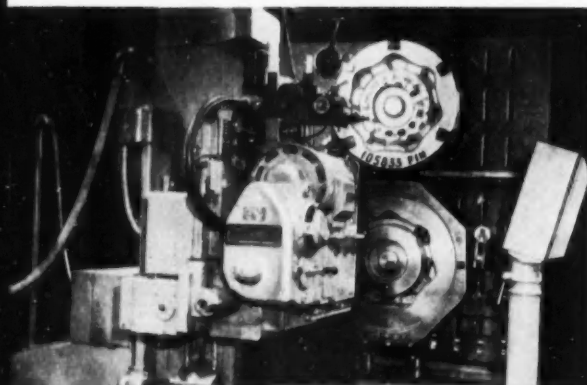
is with a

## **PRATT & WHITNEY**

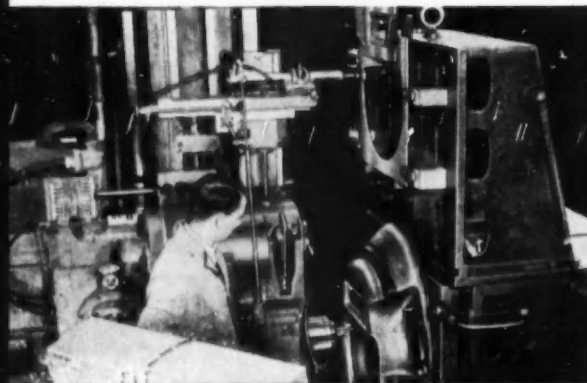
# **KELLER MACHINE**



EXPERIMENTAL AIRCRAFT PART



INTRICATE FORGING DIE

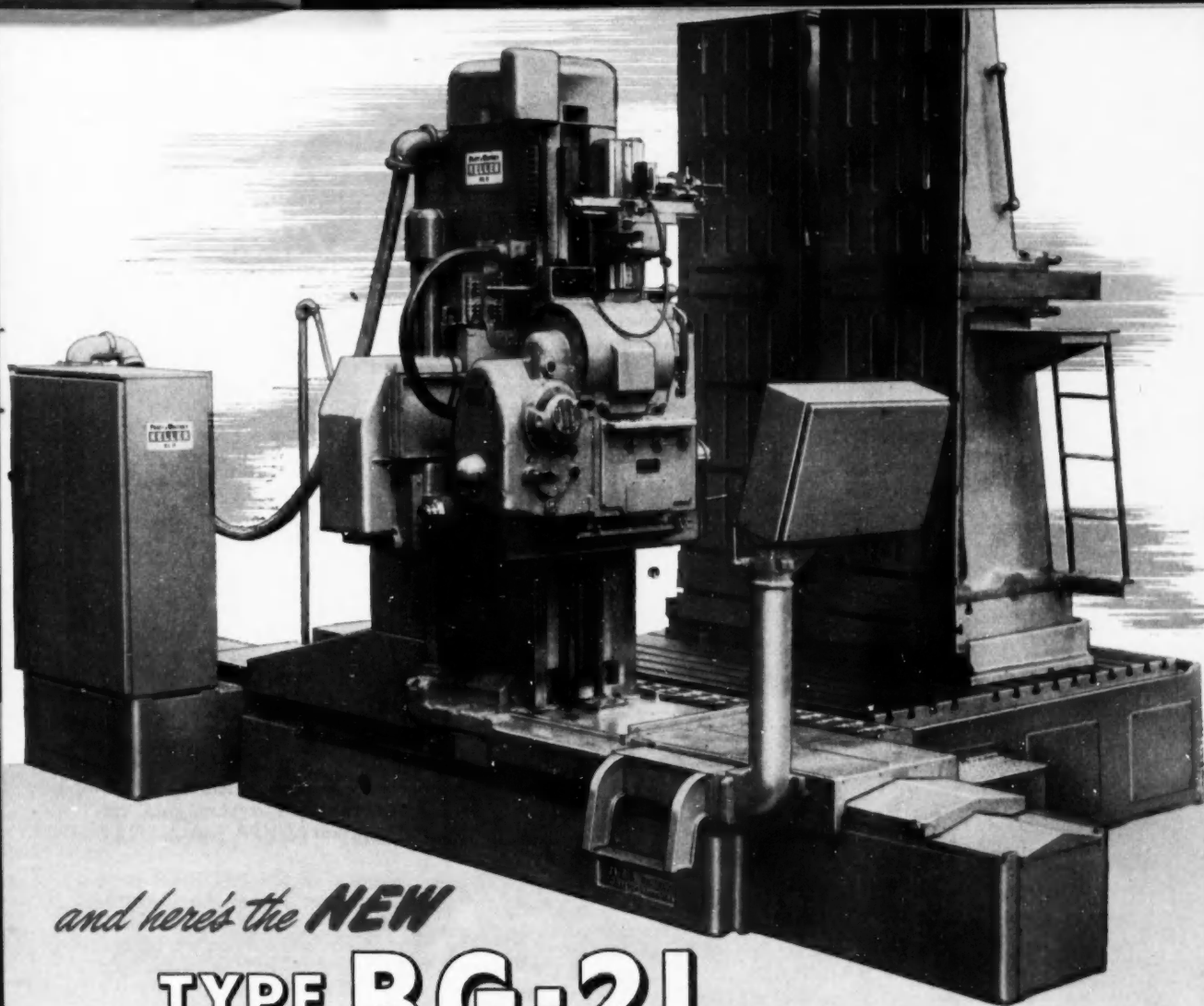


PRODUCTION CONTOUR MILLING

*Ideal for*

FORGING, STAMPING OR DIE-CASTING  
DIES — PLASTIC, RUBBER OR GLASS MOLDS — METAL  
PATTERNS — PROTOTYPE OR EXPERIMENTAL PIECES — OR  
PRODUCTION PARTS

- **MAKES HARD JOBS EASY** . . . handles irregular shapes and complex geometrical curves that cannot be machined conveniently or economically by other methods.
- **DESIGNED AND BUILT SPECIFICALLY FOR TRACER-CONTROLLED MILLING** . . . not just "adapted." Ready to take on an almost unlimited variety of jobs without major adaptation by expensive attachments.
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- **P&W BUILT-IN ELECTRIC TRACER CONTROL** . . . provides instant changeover from two-dimensional (profiling) to three-dimensional operation or vice versa . . . duplicates templates or full models exactly without compensation.
- **P&W HORIZONTAL CONSTRUCTION** provides **GREATER STRENGTH, RIGIDITY, EFFICIENCY and CONVENIENCE** . . . by moving the machine elements of constant-weight and holding stationary the workpieces of variable-weight, more uniform cutting action is obtained.



and here's the **NEW**  
**TYPE BG-21**

**TWO STANDARD SIZES**

5 feet x 2½ feet  
 6 feet x 4 feet

**SINGLE AND TWO-SPINDLE MODELS**

Patterned after the famous giant Keller Type BG-22 but smaller in overall size and capacity, the new Type BG-21 P&W Keller Machine is an entirely new design and incorporates many important new features.

**FEATURES**

- **CENTRALIZED "PUSH BUTTON" CONTROL** . . . with all machine motions operated by push buttons or switches centralized on a single, conveniently located panel.
- **SIMPLIFIED LUBRICATION** . . . by a one-shot system actuated by a single pump at the operator's station. Insures quick, positive, thorough lubrication of all sliding surfaces.
- **NON-SCORING WAYS** . . . because phenolic-to-metal bearing surfaces are used throughout, (including feed-screw nuts) and telescoping guards are provided to protect the horizontal ways. Operation is smooth, wear is minimized, and original high accuracy is maintained indefinitely.
- **AUTOMATIC CHIP DISPOSAL** . . . screw conveyor type . . . eliminates stopping production to clear away chips.

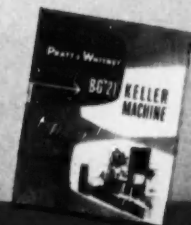
**For Complete Information**

Write on your Company letterhead for your free copy of the new BG-21 Circular No. 565.

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**MACHINE TOOLS • CUTTING TOOLS • GAGES**

# ON OUR WASHINGTON WIRE



Industrial expansion may now have entered a phase comparable to the Government's mobilization stretchout. ODM predictions of \$12.5 billion worth of tax-amortized new expansion early this

year was followed by completions at less than half that rate so far.

Wide-open industrial expansion plans that marked U. S. entrance into two world wars in the 10-year

period 1941-1951 are to be avoided in any future all-out mobilization program. Administration leaders, surveying the reports of waste and inefficiency that resulted from grandiose armament planning following Pearl Harbor and again following the start of the Korean war, are determined to avoid any such costly pitfalls in another shooting war.

Business and Defense Services Administration opened for business this month. In addition to pinpointing trouble spots in the economy and providing what Sec. Weeks called "a focal point for effective cooperation between business and government," the new Commerce Dept. agency takes over enforcement of the defense materials system and administration of NPA orders.

Windup of the RFC next June 30 may yet leave the Government in the synthetic rubber business. Requirements in the rubber disposal law written last year were called unreasonable by the co-author of new legislation designed to sell the 28 plants.

Government ban on the use of scarce alkylate in automobile gasoline has been suspended until Jan. 1. The prohibition was lifted on Oct. 1 because production of aviation gasoline is exceeding anticipated output, and also because difficulties in obtaining steel plate for new storage tanks are being met by the oil industry.

Eisenhower Administration is considering asking Congress to up the present 75-cents-per-hour minimum wage to \$1.25 per hr. Strategy is that the \$1.25 figure would be used as a bargaining point from which to reach final settlement on a \$1 per hr minimum wage. Several bills calling for \$1.25 per hr are pending in the Congress, but none carry official White House blessing. Personal appeal by President Eisenhower for an increase could produce the desired 25-cents-per-hr increase.

consider these 6 advantages of designing your product with a...



Intermittent high torque motor with low weight factor; for aircraft and many other applications.

## Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTOR

A Lamb Electric Motor — specially engineered for your product — makes available the following six important advantages:

### IN THE MOTOR...

1. Reduced cost, weight, space.
2. Exact mechanical and electrical requirements.
3. Thorough dependability.

### IN THE PRODUCT...

4. Better performance.
5. Improved appearance.
6. Compactness, less weight.

Our engineering department will be glad to team up with yours to help obtain these results.

The Lamb Electric Company  
Kent, Ohio

In Canada: Lamb Electric—Division of  
Sangamo Company Ltd.—Leaside, Ontario



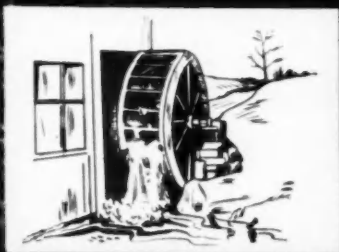
Universal motor with shaft carried on double row ball bearings; developed for use as a high-speed grinder.

THEY'RE POWERING AMERICA'S *Finest* PRODUCTS

## Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS





On Our Golden Anniversary we salute the . . . . .

ONE OF A SERIES

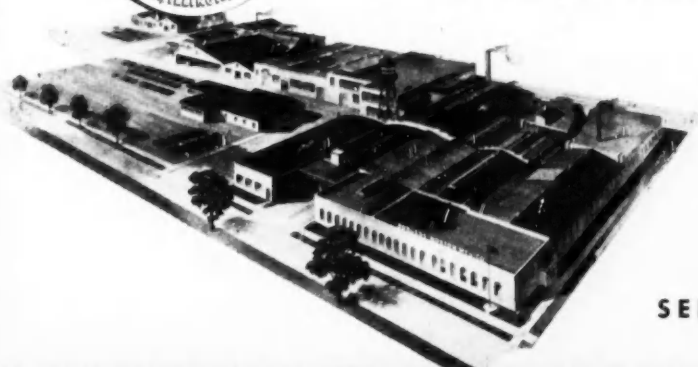
## *Industrial Engine Manufacturers*

Stretching over the United States, miles from the nearest power lines, are mines, oil fields, road construction crews, and many others whose entire operations are made possible only through power supplied by industrial engines.

At one time, these "outpost" businesses had to depend upon power from water or wind, or run in from

lines over miles of difficult terrain. The expense and uncertainty of these power sources made many operations commercially unfeasible, but today with rugged dependable industrial engines at work, inexpensive power is at man's disposal in even the most remote and inaccessible places.

In these and in many other applications, industrial engines are making a real contribution to today's living, and Burgess-Norton, producing piston pins and other precision parts, is gratified for its role in adding to the dependable performance of these engines.



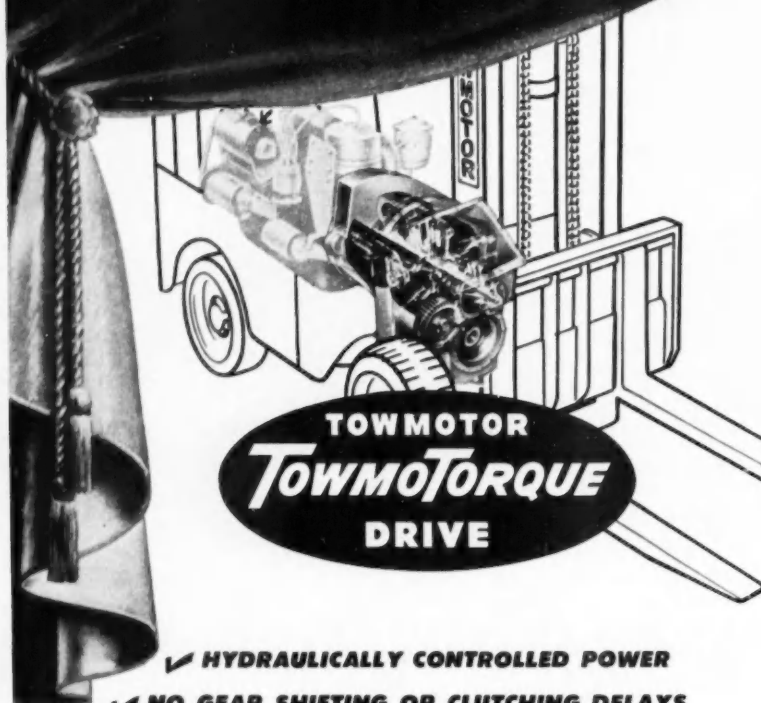
**BURGESS-NORTON MFG. CO.**

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SERVING INDUSTRY FOR 50 YEARS



## PRESENTING A GREAT NEW CONCEPT IN FORK LIFT TRUCK OPERATION...



- ✓ HYDRAULICALLY CONTROLLED POWER
- ✓ NO GEAR SHIFTING OR CLUTCHING DELAYS
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From the first name in Mass Handling Equipment comes the last word in torque drives for fork lift truck applications. Here is a product of intensive research and engineering, truly a trouble-free torque converter drive . . . available to match the capacity range of all Towmotor power plants. Here is the one drive that adds still more to superior Towmotor performance. For the complete story in a nutshell, send for book on TowmoTorque now.

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**TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE**

## The Business Pulse

(Continued from page 86)

further reassurance, the Secretary has stated that the Administration is prepared to take vigorous contracyclical action if trouble develops. These remarks by the Secretary of the Treasury appear to have had some stabilizing influence on financial sentiment. Security markets, for example, have shown a somewhat firmer tone in more recent days.

### Personal Income Higher

The calmer appraisals of economic trends now in evidence tend to stress the point that a decline, if one does occur in 1954, is likely to be limited in scope and severity. In support of this contention, proponents stress first and foremost the tremendous momentum still present in business activity. At the end of the summer period, aggregate civilian unemployment was running at a record total of more than 63 million, while employment was at a post-war low of approximately 14 million, or only 1.9 per cent of the entire labor force. With wage rates at record highs also, personal income was setting new marks. In July, the latest month for which information is available, personal income was running at an annual rate of \$288 billion, almost \$22 billion higher than the July, 1952, annual rate. Farm income was off by \$2.7 billion at an annual rate, but nonagricultural income was up by almost \$21 billion. This record level of employment and income, which tends to be self-sustaining, indicates that the boom is not likely to disappear overnight.

Moreover, the information that can be gathered at present does indeed suggest that the decline in defense expenditures over the remainder of fiscal 1954 will be moderate, hardly enough, by itself, to have a severe impact on the economy. Some estimates place the amount of defense spending for next June at about \$300 million to \$350 million below outlay in June, 1952, which would be a decline of some 7 to 9 per cent. Projections of outlay by businessmen for new plant and equipment also show a decline beginning in the final quarter of this year, but here also the reduction is expected to be moderate.

### Tax Reduction Benefit

It is sometimes argued that the forthcoming reduction in personal and business taxes will result in an increase in consumer expenditures that

(Turn to page 152, please)

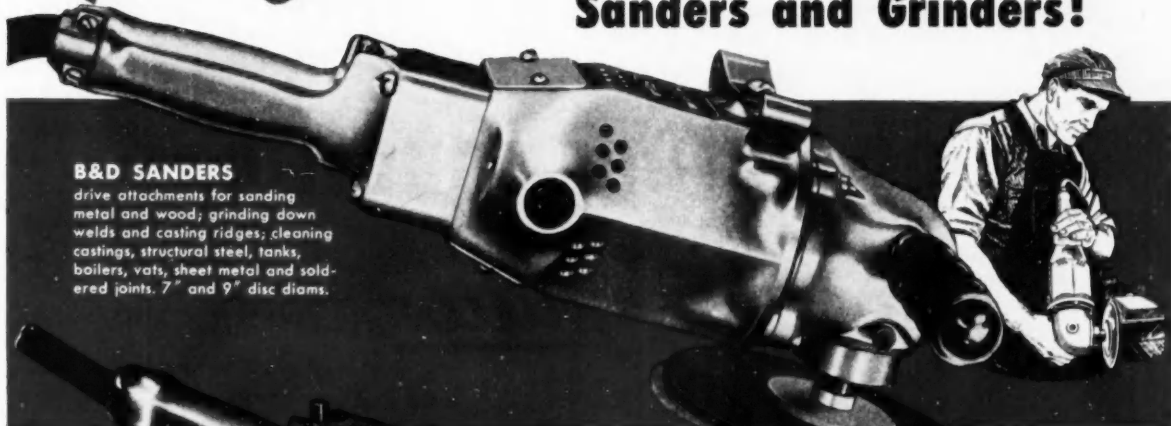
Work heavy, bulky, hard to move?

# Bring the tool to the work...

with Black & Decker  
Sanders and Grinders!

## B&D SANDERS

drive attachments for sanding metal and wood; grinding down welds and casting ridges; cleaning castings, structural steel, tanks, boilers, vats, sheet metal and soldered joints. 7" and 9" disc diams.



## B&D PORTABLE GRINDERS

prepare surfaces for welding; smooth welds, snag and grind castings; remove rust, scale, old paint; cut off old rivets, studs, bolts; grind, clean and buff frames, cabinets, etc. 5" and 6" wheel diams.

## They're powerful and portable!

**N**O MATTER how big or bulky your abrasive jobs, you'll cut costs and speed up work when you switch from hand methods to Black & Decker power! B&D Sanders drive abrasive discs, saucer grinding wheels, "Whirlwind" wire cup brushes, gouging and planing heads. B&D Portable Grinders drive grinding wheels, "Whirlwind" wire wheel brushes, cotton buffing wheels. And both give you: (1) Dependable, full-powered motors tailor-made by Black & Decker for the tools they drive; (2) Perfect balance for easy handling, less operator fatigue; (3) Tough, longer-lasting parts for extra years of service, lower tooling costs!

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PORTO-GRINDERS

# Influence of engine operating conditions on *Pre-Ignition*

**Research at the DU PONT PETROLEUM LABORATORY  
reveals important data on this question.**

An increase in engine compression ratios has made possible more efficient utilization of fuels. However, the benefits are accompanied by an increase in the tendency for pre-ignition to occur during road operation. This presents a real problem to both automotive engineers and petroleum refiners.

## **HARMFUL EFFECTS OF PRE-IGNITION**

Abnormally high rates of pressure rise in the cylinder—often accompanied by a loud noise—result from pre-ignition. If these conditions are severe enough, they can cause actual destruction of engine parts.

Therefore, pre-ignition may become a very real obstacle to improving the performance of fuels in engines . . . an obstacle approaching or exceeding knock in importance.

## **CAUSED BY DEPOSITS**

Combustion chamber deposits are the primary cause of pre-ignition in modern automotive engines.

The ability of deposits to induce pre-ignition arises from localized high temperatures. These are developed through the combustion of carbonaceous material in the deposit structure.

**DUPONT SUPPLIES A COMPLETE LINE OF GASOLINE ADDITIVES**  
*Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes*  
*Also: Fuel Oil Stabilizer • Grease Stabilizers*



## ENGINE OPERATING CONDITIONS

Operating conditions of the engine have considerable influence on the burn-off of carbonaceous material.

The occurrence of pre-ignition is favored by changes in engine operating conditions which result in the development of higher pressures and temperatures during compression. It is also favored by changes which cause an increase in the concentration of oxygen available to support the combustion of carbonaceous material.

Increased compression ratio, supercharging, operation with retarded spark timing, and the combustion of lean mixtures are, therefore, likely to increase the tendency for pre-ignition to occur.

## PRE-IGNITION RESISTANCE OF FUELS

Some hydrocarbons have a greater tendency to be ignited by hot deposit particles than others. Preflame reactions, also, tend to sensitize the fuel to ignition.

The effect of these preflame reactions can be minimized by tetraethyl lead. In this way, *tetraethyl lead* not only prevents knock . . . but also *reduces the tendency for pre-ignition to occur.*

## CONTINUING STUDIES

This work on pre-ignition is part of a continuing research program at the Du Pont Petroleum Laboratory. The aim of the program is to help the refining industry improve fuel performance through the use of additives.



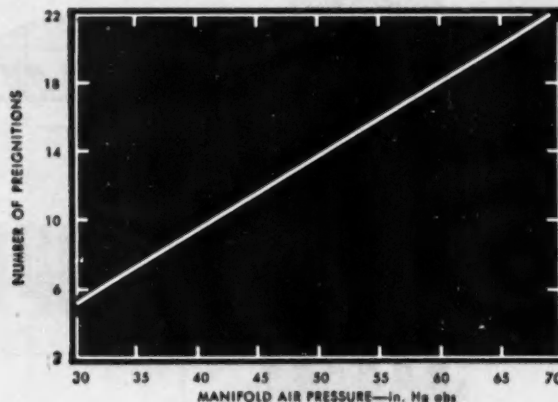
# Petroleum Chemicals

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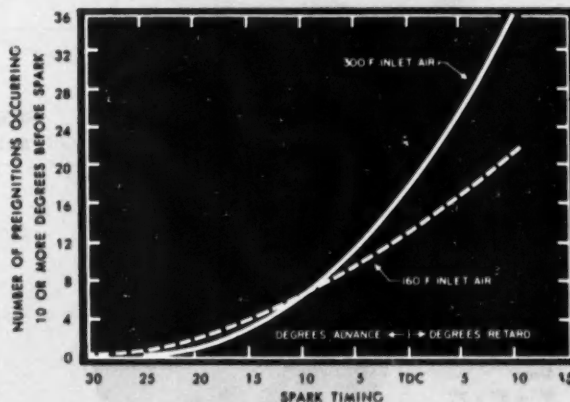
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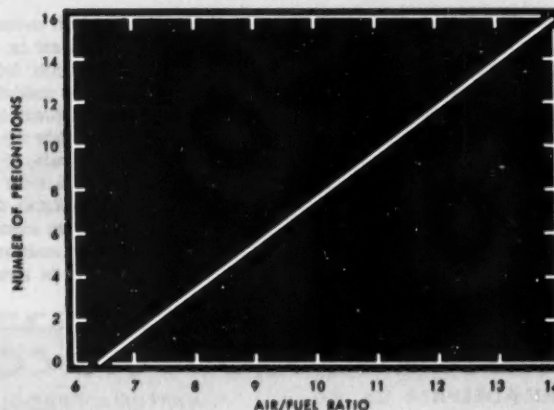
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Effect of manifold pressure\* on pre-ignition.



Effect of spark timing and inlet air temperature\* on pre-ignition.



Effect of air/fuel ratio\* on pre-ignition

\*Test with single-cylinder engine.

# the **Waterman** INDUSTRIAL POCKETSCOPE®



MODEL  
S-11-A

Size:  
11" x 5" x 7"  
8 1/2 Pounds

## ANOTHER EXAMPLE OF **Waterman** PIONEERING...

The INDUSTRIAL POCKETSCOPE, model S-11-A, has become America's most popular DC coupled oscilloscope because of its small size, light weight, and unique flexibility. This compact instrument has identical vertical and horizontal amplifiers which permit the observation of low frequency repetitive phenomena, while simultaneously eliminating undesirable trace bounce. Each amplifier sensitivity is 0.1 Volt rms/inch. The frequency responses are likewise identical, within -2 db from DC to 200 KC. Their total undistorted outputs permit effective trace expansion of twice the screen diameter. The internal

sweep generator is continuously variable from 3 cycles to 50 KC and can be synchronized from positive going signals. Return trace blanking is optional. Intensity modulation is accomplished by connecting either directly to the grid of the three-inch cathode ray tube or thru an amplifier having a gain of approximately 10 and a flat response to 500 KC. Direct intensity modulation threshold voltage is approximately 1 volt rms. Additional provisions for direct access to all the deflection plates, the second anode, and the amplifier output terminals extend the usefulness of the S-11-A many fold.

## WATERMAN PRODUCTS CO., INC.

PHILADELPHIA 25, PA.

CABLE ADDRESS: POKETSCOPE



**WATERMAN PRODUCTS**

### WATERMAN PRODUCTS INCLUDE

S-4-A SAR	PULSESCOPE®
S-5-A LAB	PULSESCOPE
S-12-B JAMized	RAKSCOPE®
S-14-A HIGH GAIN	POCKETSCOPE
S-14-B WIDE BAND	POCKETSCOPE
S-15-A TWIN TUBE	POCKETSCOPE

Also KAYONIC® Cathode  
Ray Tubes and Other  
Associated Equipment

## The Business Pulse

(Continued from page 148)

will offset, or more than offset, declines in military outlay and investment expenditure. Conceivably this could be the case, since the dollar amount of tax reduction apparently will be bigger than the dollar amount of reduction in defense outlay and business investment that is currently anticipated. However, there is considerable skepticism that this will actually occur, for it implies a very neat transition from the output one group of products (military equipment and capital goods) to a different group (consumer goods). Many analysts believe that as a practical matter the friction of adjustment, which may well affect consumer psychology, is likely to negate—or at least partially offset—the theoretical stimulus of tax relief. While the actual outcome of these counterbalancing influences is exceedingly difficult to judge, it seems reasonable to expect that the over-all level of demand (by Government, businesses and individuals) can hardly be expected to undergo any radical change, at least in the early part of 1954.

## Inventory Situation Improved

The inventory situation, which has been a cause of considerable concern in recent months, took a turn for the better in July, the latest month for which information is at hand. At the end of that month, total business inventories, at \$77 billion, were approximately \$600 million higher on a seasonally adjusted basis than at the end of June. This rate of accumulation represents an appreciable slackening from the disquieting pace of the preceding three months. Moreover, the slowdown was especially pronounced in physical terms, since more than half of the July increase was occasioned by higher replacement costs.

## AUTOMOTIVE INDUSTRIES...

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## **we serve the aircraft industry, too**

Spicer's 50-year record of service to the automotive industry is well known. But do you know that our long experience and highly developed skill are also helping to produce the world's fastest, highest-flying bomber?

We are manufacturing gears of almost unbelievable standards of quality and precision, for use in the new six-jet Boeing B-47 engines. These \$2,000,000 planes travel at 600 miles per hour, and can drop a full load of bombs from an altitude of 7½ miles anywhere in the world.

On the earth as in the sky, Spicer helps man move faster, better, more efficiently.



# A Masterpiece of

## METALLURGY

## MACHINING

## MICROMETRY

This gear, used in the J-47 jet engines, is typical of the superb workmanship exercised by Spicer in manufacturing aircraft gears.

Metallurgy is of prime importance. The parts are light in weight, with thin sections, and therefore must have maximum high strength. We have the most advanced metallurgical laboratory, for the analysis of chemistry of steels, inspection for flaws, and assurance of proper grain flow in forgings.

We have the newest equipment for heat treating, including gas carburizers, homo-carbs, rotary hardening furnaces, and a variety of quench presses and dies to control distortion.

Machining of these gears is held to tolerances of .0002 on the teeth. The cutting, grinding, shaving of gears and splines, and plating, is done on the finest precision equipment in the industry. Since aircraft parts must be completely interchangeable in the case of these gear units, absolute consistency must be assured.

And because aircraft engines must be highly resistant to wear, erosion, corrosion, and abrasion, the physical dimensions as well as finish, hardness and depth of hardness, the most delicate controls available are used.

The high stress under which the gears operate demand that the surfaces be absolutely free of scratches, and in most cases be very highly polished.

The skills which Spicer has developed in 50 years of service to the automotive industry now serve the aircraft people equally well.

**SPICER MANUFACTURING DIVISION**  
of Dana Corporation • Toledo 1, Ohio



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# New Products

For additional information please use  
postage-free reply card on page 81

(Continued from page 80)

## Aluminum Coating

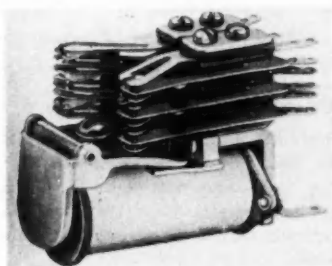
Recently developed is a protective coating for aluminum known as Alodine No. 1200. It is said to form an amorphous mixed metallic oxide coating of low dielectric resistance that provides high corrosion resistance for unpainted aluminum. In addition, it reportedly forms an excellent paint bond.

One of its unique features is that it can be used in tanks in an immersion process, or, in a multi-stage power washer in a spray process, or, with a slight adjustment of pH, with brush or portable spray equipment in a manual process. All three methods of application meet the requirements of Spec. MIL-C-5541.

Coating time in an immersion process ranges from two to eight min, and in a mechanized spray process is about 30 sec. Baths are operated at room temperatures (70 to 100 F), and heating is required only if the bath has gotten cold after a "down" period.

The compound is specifically recommended for coating wrought products that are not to be painted or are to be only partially painted; and for coating casting and forging alloys whether or not these are to be painted. American Chemical Paint Co.

Circle 37 on page 81 for more data



Pollak series 100 computer relay.

## Relay Line

Now in production is a line of relays, among which are: the Series 100 d-c computer relay; the Series 300 d-c miniature relay; the Series 400 a-c or d-c coaxial relay; and the Series

500 d-c communication relay.

Exclusive features for each class of relays are claimed by the manufacturer. For example, the bearings of the computer relays have essentially zero friction, and the relay has a life span of 10 million c.

The miniature relays weigh under two oz and incorporate a special anti-vibration feature which reportedly makes them unusually resistant to vibration and shock.

The coaxial relays are said to withstand 10 g vibration at 10-55 c per second under operation tests.

Since the communication relays can perform mechanical work in addition to operating contacts, they are reportedly ideal for those applications where automatic punching is required for control system applications. Joseph Pollak Corp.

Circle 38 on page 81 for more data  
(Turn to page 156, please)

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POWER  
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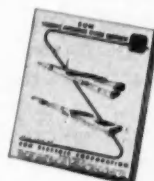
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WINFIELD**

RESISTANCE WELDERS

## New Products

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(Continued from page 155)

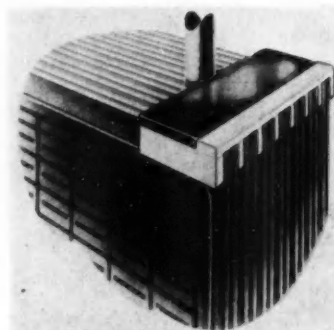
### Battery Line

Recently announced is a tractor-commercial battery line for farm users and commercial carrier operators. It is said to combine features of the manufacturer's previously separate tractor and commercial line batteries and to offer added power and service advantages.

Pointed out as a key feature of the line is an anchor to hold plates firmly in place. Severe internal vibration caused by rough roads and rocky terrain is thus stopped.

Other reported features of the line include: an extra-heavy rubber container; sturdy rubber insulation; a strong sealing compound; a means of preventing overfilling; and insulation protector. *Willard Storage Battery Co.*

Circle 39 on page 81 for more data



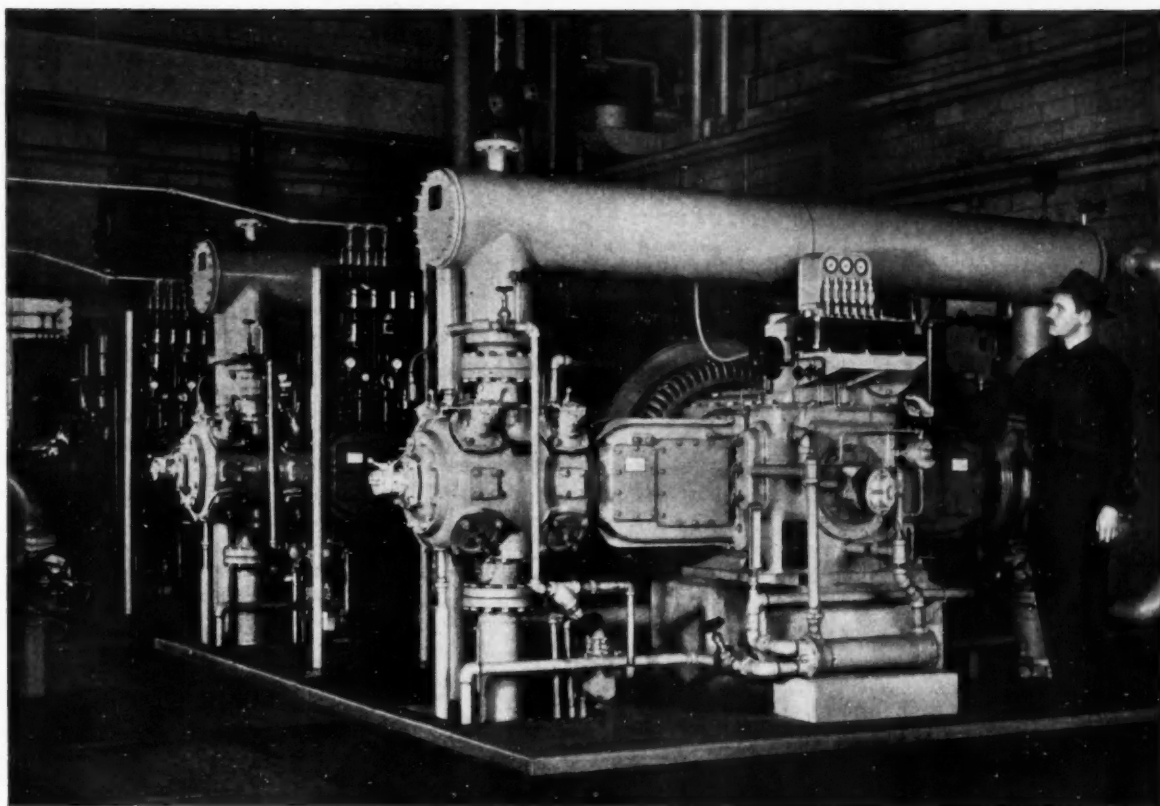
*Willard tractor-commercial battery.*

### Radial Bearings

Recently announced are Series 7500 and 7600 precision radial bearings. They are single-row, solid-race type with ball retainer and incorporate a labyrinth seal to retain lubricant and exclude foreign materials.

The bearings are designed for medium loads and speeds in the neighborhood of 5000 rpm, maximum. Both Series 7500 (no extensions) and 7600 (extended inner race with two locking set screws) can be provided with or without snap ring. *Nice Ball Bearing Co.*

Circle 40 on page 81 for more data



## Compact, totally enclosed Clark Compressors cut space and building costs in Packard's Jet Engine Power Plant

Compressed air for all manufacturing operations in Packard Motor Company's new jet engine plant, Utica, Michigan, is furnished by three Clark 200 hp Balanced/Opposed Motor Driven Compressors.

Because of their totally enclosed, dust-proof design, Packard was able to install the units directly behind the boilers, with no partition wall between. Floor-space requirements and building costs were thus reduced.

By selecting the compact Clark CMA-2, Packard was able to provide the

flexibility of a three-unit installation, within an exceptionally small space, to meet varying plant air demands.

For any industrial air compressor applications in the 150-4500 hp range — compact, vibrationless Clark Balanced/Opposed Compressors are your most practical answer. Complete information is in Bulletin 118, available on request!

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*Division of Dresser Operations, Inc.*

*Sales Offices in Principal Cities Throughout the World*

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**balanced/opposed compressors**

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Rocker Arms • Mechanical Tappets • Push Rods • Self  
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BELLWOOD, ILLINOIS  
Established 1872

## MEN in the NEWS

(Continued from page 25)

Pesco Products Div., Borg-Warner—Appointment of Paul W. Brannon as vice-president of manufacturing has been announced.

Clevite Corp.—Willard W. Brown was advanced recently to director of marketing.

Tinnerman Products, Inc.—Lawrence H. Flora fills the new post of director of sales, continuing as director of engineering. Edward E. Griger is sales manager, replacing W. H. Taylor, who has joined Packard. William I. Seitz is now chief engineer. John Balint is new product manager and Clarence Van Neil is in charge of development engineering.

Oakite Products, Inc.—Samuel E. Beal has joined the firm as manager of the Aviation Div. with headquarters in Los Angeles.

Clearing Machine Corp.—Robert E. Sanford has joined the staff of engineering consultants.

Titanium Metals Corp.—E. R. Rowley was named president of this subsidiary of National Lead Co. and Allegheny-Ludlum Steel Corp.

American Bosch Corp.—Donald H. Spicer now heads both manufacturers and service sales for the company.

Dayton Rubber Co.—John J. Walsh is now advertising manager, and Robert T. Hollister is manager of the public relations staff.

Bristol Co.—Ernest Nuber has been appointed sales manager, instrument division.

Furane Plastics, Inc.—Wesley E. Weber recently joined the company as a development engineer.

Illinois Tool Works—Carl F. Jensen has been named plant manager of the Des Plaines, Ill., stamping plant of the Shakeproof Div.

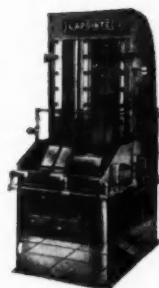
Groer Hydraulics, Inc.—William J. Cunningham is now assistant sales manager for industrial hydraulic accumulators and components.

Norton Co.—Dr. Newman W. Thieme is assistant director of research and development in charge of the physical research and microscopic sections.

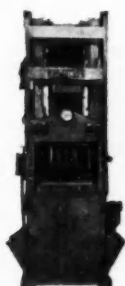


**SRV**

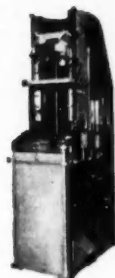
3 to 25 ton, 30" to 90" stroke

**DRV**

3 to 25 ton, 30" to 90" stroke

**VPV**

10 to 25 ton, 36" to 60" stroke

**VPD**

5 to 50 ton, 36" to 60" stroke

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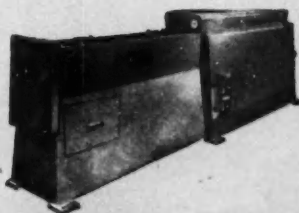
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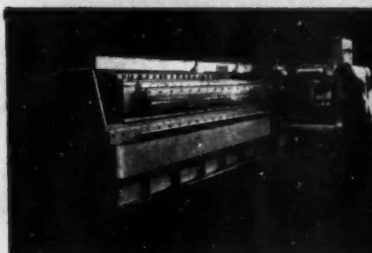
*Whatever it is, you can be sure that it is available among the more than 50 types and sizes of broaching machines that are standard with LAPORTE!*

Here are a few machines representing basic designs. They embody engineering skill and broaching experience extending back over fifty years — a wealth of experience exceeding that of every other broaching machine manufacturer.

LAPORTE can take the responsibility for the *complete broaching problem*, because we also design and build *fixtures and broaches* for use on our broaching machines.

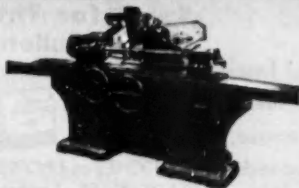
**HP**

2½ to 50 ton, 30" to 78" stroke



...and here's the *latest* LAPORTE machine:

**SRHE** Capable of broaching speeds up to 300 fpm and more! Strokes 90" up to 180".

**SHARPENERS** in these sizes:

36" 60" 72" 80"

# RUSSIA'S STRENGTH TODAY

(Continued from page 45)

## Manpower

Analysis of population trends in the Soviet Union leads to the conclusion that the age-group 16-59 will increase by seven to eight million persons, male and female, between 1950 and 1955. Nevertheless, the Fifth Five-Year Plan does not account clearly for the employment of so great an

increase. The number of collective farmers is supposed to remain stable, while that of civilian workers and employees is to rise by 15 per cent, or 5.9 million. Some increases in students may also be contemplated, though the increased enrollments in secondary and higher education are largely being offset by decreases in the industrial schools and in the State

Labor Reserves. Finally, not the slightest indication exists that the Soviets have anticipated any withdrawal of women and the aged from the labor force. Planned increases in the armed forces may account for part of the unexplained residual, but the available information is too uncertain for a firm judgment.

The actual developments to date are also obscure. The reduction in the number of collective farms from 250,000 to 97,000, accomplished early in the Fifth Five-Year Plan period, undoubtedly freed appreciable numbers of persons for other employment. What has been done with them—what proportion of them are, for example, working on construction "brigades"—is not known. The available statistical information on actual developments pertains only to the workers and employees' sector, which has grown from 39.2 to 42.4 million, or by eight per cent, in the last two-and-a-half years. (Table IV.) The increment to manufacturing, mining and utilities has constituted 1.8 million persons, or 56 per cent of the total; that to health and education, 472,000 or 13 per cent of the aggregate. The other figures have been interpolated on the basis of partial indications.

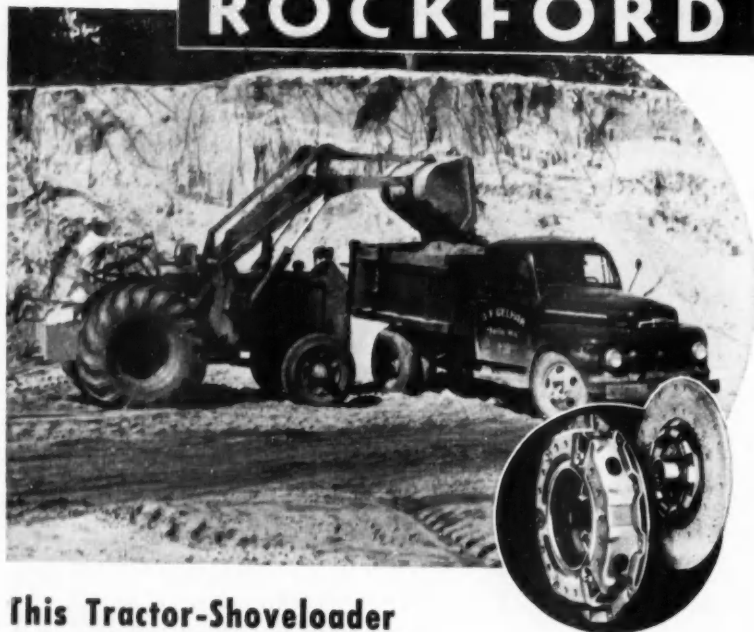
Some observations on the growth of labor productivity in Soviet manufacturing and construction may be derived from the data presented. In the former, productivity has risen about 16 per cent (or, in Soviet values, 19 per cent) in two-and-a-half years, a notable achievement, though one far below the fantastic Soviet goal of a 50 per cent increase in five years. In construction, only the Soviet index is available; this reveals a 15 per cent productivity increase, against the 1950-1955 target of 55 per cent. Clearly, the Soviets cannot achieve their industrial output and construction goals with the contemplated manpower ceilings. Yet a rapid increase in the non-agricultural labor input can be accomplished only by further crowding of the desperately inadequate housing and facilities of Soviet cities. The Kremlin's solution of this dilemma is not yet clear.

## Armaments and Consumption

The evidence reviewed to this point has indirectly shown a severe armaments burden upon the Soviet economy: in the disproportion between the growth of basic industrial indices and producers' goods output, in the curious shortages of trained person-

(Turn to page 164, please)

## CLUTCHES by ROCKFORD



### This Tractor-Shovel loader Sure "Dishes Up The Dirt"

MINNEAPOLIS-MOLINE Industrial Wheel Tractors (shown with mounted shovel loader equipment) are built to deliver continuous full engine torque, at any of the 6 forward or 6 reverse speeds. ROCKFORD CLUTCHES help them move heavy road-building materials with ease and precision. Let ROCKFORD clutch engineers help specify the most practical power transmission controls for your machines.

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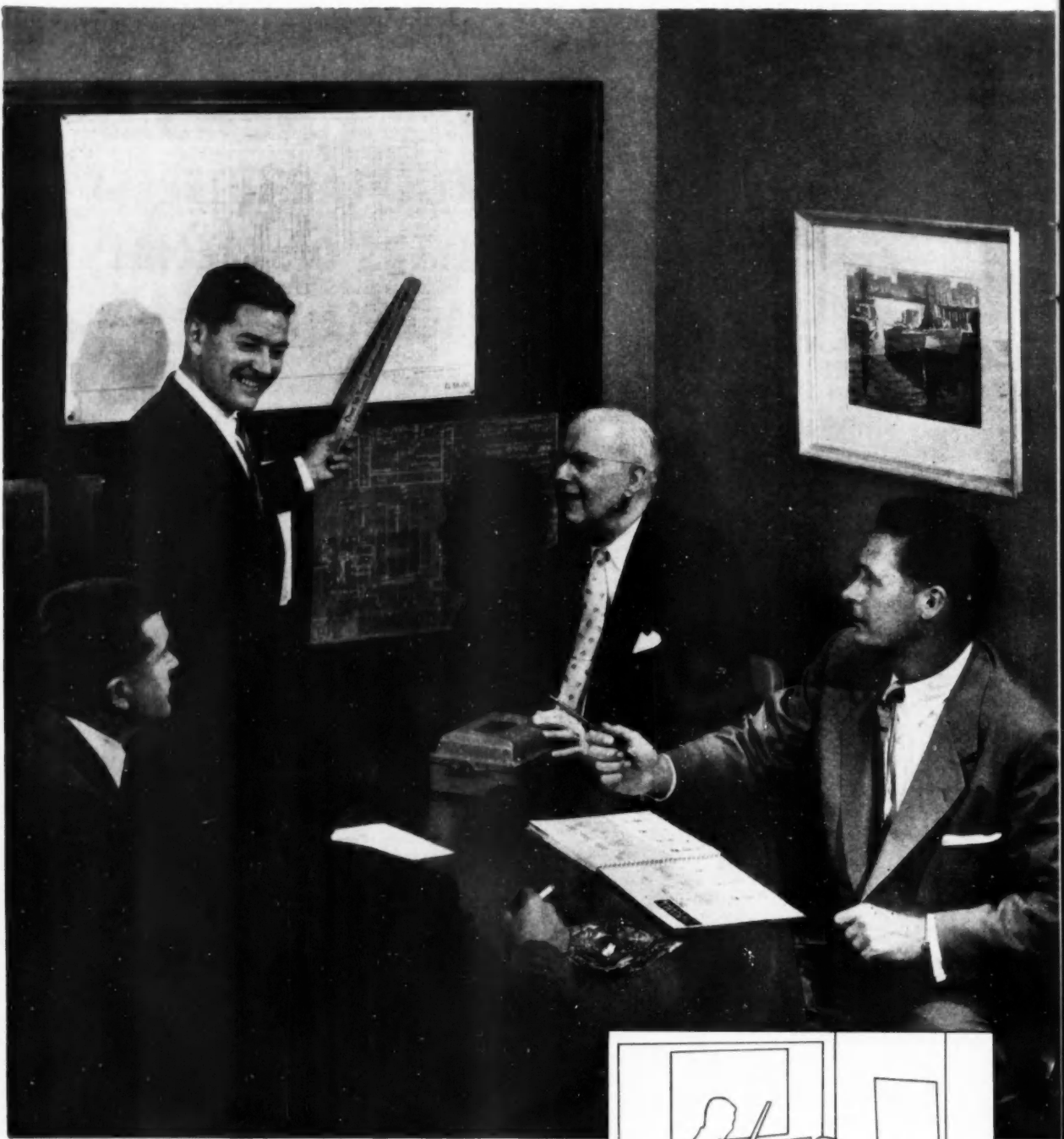
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2. Westinghouse Sales Engineer
3. Chief Engineer
4. Electrical Engineer
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# Your motor and control problems are local ... so is Westinghouse application assistance

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Your local Westinghouse sales engineer has a broad knowledge of all Westinghouse Motors and Controls. He knows their capabilities and limitations. He knows how to match motors and controls for maximum production.

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Your local Westinghouse product engineer is a specialist in one type of motor or control. These men work at the local level but operate from a manufacturing headquarters office.

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## Application engineers work out of 126 Westinghouse offices

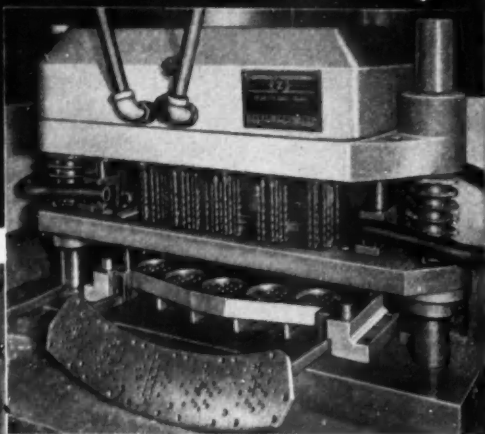
Akron 8, Ohio	Jefferson 3165	Fort Wayne 2, Ind.	ANihony 3421	Pittsburgh 30, Pa.	Atlantic 1-8400	Spokane 8, Wash.	MAIN 3294
Albany 5, N. Y.	8-7801	Fort Worth 2, Tex.	FOrtune 4086	Portland 4, Ore.	Capitol 1-9151	Springfield, Ill.	3-1532
Albuquerque, N. M.	3-1826	Fresno 1, Cal.	4-5097	Providence 3, R. I.	GAspee 1-0818	Springfield 3, Mass.	6-8373
Allentown, Pa.	HEmlock 4-5108	Gary, Ind.	2-1468	Raleigh, N. C.	6302	Syracuse 4, N. Y.	2-1361
Amarillo, Texas	6-7838	Grand Rapids 2, Mich.	9-3106	Reading, Pa.	2-0287	Tacoma 2, Wash.	BRoadway 6565
Appleton, Wis.	4-4116	Greensboro, N. C.	2-3415	Richmond 19, Va.	2-4758	Tampa 1, Fla.	2-7246
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Augusta, Maine	3-4571	Hammond, Ind.	RUSsell 8937	Rochester 7, N. Y.	MOHree 1635	Trenton 10, N. J.	2-4136
Baltimore 2, Md.	PLazo 0300	Hartford 3, Conn.	5-0851	Rockford, Ill.	2-3452	Tulsa 3, Okla.	3-3191
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Bluefield, W. Va.	3-9131	Indianapolis 9, Ind.	MArket 3301	Saginaw, Mich.	4-2640	Washington 6, D. C.	NAtional 8-8843
Boston 10, Mass.	Liberty 2-0600	Jackson, Mich.	2-0519	St. Louis 1, Mo.	CEntal 1120	Waterloo, Iowa	4679
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Buffalo 3, N. Y.	WAShington 3966	Jamestown, N. Y.	78-6492	San Antonio 5, Tex.	GArdfield 5114	Wheeling, W. Va.	6222-6223
Butte, Mont.	2-2301	Johnstown, Pa.	8939	San Diego 1, Cal.	MAIn 8151	Wichita 2, Kansas	5-2631
Canton 2, Ohio	3-9171	Kansas City 6, Mo.	HArrison 7122	San Francisco 8, Cal.	EXbrook 2-5353	Wilkes-Barre, Pa.	3-1144
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Dallas 1, Tex.	Riverside 5231	Mobile, Ala.	8-5443				
Davenport, Ia.	3-2761	Nashville 3, Tenn.	42-3505				
Dayton 2, Ohio	ADams 9153	Newark 2, N. J.	MArket 2-0200				
Denver 2, Colo.	KEystone 8121	New Haven 10, Conn.	5-3191				
Des Moines 8, Iowa	2-0244	New Orleans 13, La.	RAYmond 8656				
Detroit 31, Mich.	TRinity 2-7010	New York 5, N. Y.	WHitehall 3-4321				
Duluth 2, Minn.	7-1541	Niagara Falls, N. Y.	9700				
El Paso, Tex.	2-5691	Norfolk 10, Va.	5-1639				
Emeryville 9, Cal.	OLympic 2-3770	Oklahoma City 2, Okla.	BEgent 6-1633				
Erie, Pa.	24-867	Omaha 2, Nebr.	HArney 8700				
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# UNITED AIRCRAFT chooses *Zagar* engineered drilling for J-47 Jet Engine Parts



Zagar evolves best method for drilling 383 holes in header plates and manifold for liquid-to-liquid heat-exchanger. Photographs by courtesy of UNITED AIRCRAFT PRODUCTS, INC., Dayton, Ohio.

The job: to save most time and money in drilling 365 holes .200 diameter and 18 holes 5/16" diameter. Zagar engineered drilling licked it.

● You, too, can profit from the often demonstrated ability of Zagar gearless drillheads to drill hundreds of holes at one pass. Zagar's engineered drilling permits record-breaking performance without drill breakage. Used alone or combined into 4-post machines, Zagar gearless drillheads drill any material and any size hole on all centers as close as twice the drill diameter. No application is too difficult for Zagar standard machines 16", 24", 32" and 40", or for special machines to fit your needs exactly. All this, at a new low cost of tooling.

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## RUSSIA'S STRENGTH TODAY

(Continued from page 160)

nel in industrial construction, and—possibly—in discrepancies between the increases in labor force and known employment. Let us now turn to more direct fiscal evidence on trends in the armaments load and in civilian consumption in 1951 and 1952, and on recent indications of new, changed policies therein.

To understand the fiscal evidence, four points of classification are needed. First, the Soviet price structure, being an artificial creation heavily affected by subsidies on producers' goods and by enormous sales taxes on consumers' goods, does not represent a homogeneous system of valuation from one segment of the economy to the other. The picture has, furthermore, been changing, with complex modifications both up and down. In general, it can only be said that the Soviet ruble expended for military purposes appears to be worth more, in U. S. prices, than the ruble in consumers' goods. Thus the budgets (Table V) very likely understate the proportions of military to civilian expenditures as they would be measured by a U. S. value system. Second, a marked deflationary process has been taking place in the U. S. S. R. since 1950. Prices on consumers' goods dropped by some 13 per cent from 1950 through 1952. For producers' goods, the fall was probably comparable, an indication of this being the claimed 15.8 per cent drop of industrial construction costs between July 1, 1950, and October 1, 1952 (Stroitel'stvo 1953 No. 1:3-7). Thus current ruble figures likewise understate the increases between 1950 and 1952 by 10 per cent or more. Third, Soviet military expenditures are comprised within at least three accounts: the open expenditures for the armed forces, the "residual" expenditures (the bulk of which fall to the MVD, the agency for atomic energy, internal security, and espionage), and part of those for the "national economy." Within this last account come capital outlays and subsidies for the Ministry of Defense Industries (aviation, shipbuilding, ammunition, etc.). And fourth, it is not certain whether extraordinary expenditures for the Korean War and for stockpiling (raw materials, reserve machine-tools,

(Turn to page 166, please)

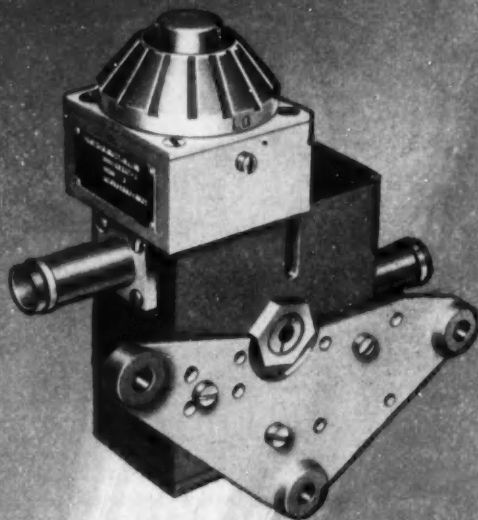
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## **RUSSIA'S STRENGTH TODAY**

*(Continued from page 164)*

transportation equipment, food, clothing, footwear, etc.) have been included in the budget at all. They may have been financed separately, through bank credits or otherwise.

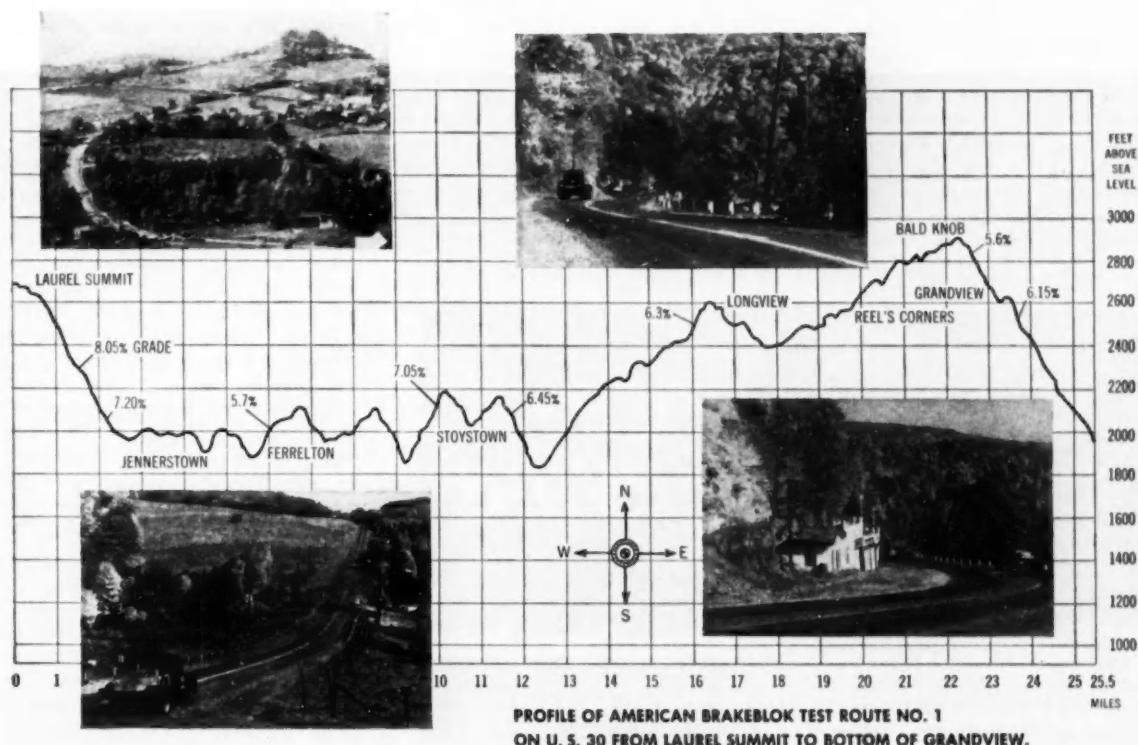
Bearing these points in mind, we see, furthermore, that, in current ruble figures, open military and "residual" expenditures together increased by 14 per cent between 1950 and 1952; in real terms the rise was at least 25 per cent. (Table V.) In the present year, the monetary figure alone is to reach a level 32 per cent above 1950. In contrast to most of the civilian economy, the Soviet armaments program appears to be on schedule. At the same time, the shift in emphasis should be noted. Spending on conventional armed forces, which rose 43 per cent (in ruble terms) between 1950 and 1952, is now scheduled for stabilization, while "residual" spending, which had been declining, is to rise 65 per cent. Evidently, the achievement of the hydrogen bomb, the greatest success of the Fifth Five-Year Plan thus far, is stimulating a strongly intensified drive for atomic supremacy.

Even Soviet official sources acknowledge that the consumers' share of the national product dropped between 1950 and 1952. Over this period the claimed rise in Gross National Material Product at constant prices is 24 per cent, against an alleged increase of 17 to 18 per cent in real consumers' income. These figures are, moreover, greatly exaggerated, since collective farm incomes, rather than growing rapidly, have fallen, as Malenkov himself made perfectly clear in his speech of August 9, 1953. More convincing assessments of the rises in G. N. M. P. and in real consumers' income in 1950-1952 would be 20 per cent and 10 to 13 per cent, respectively. These increases in living standards, it must be remembered, pertain to a very low 1950 base (15 per cent the American per capita disposable income), and have been enjoyed only by the urban folk. The growth of consumer income in 1950-52 was at a rate of increase well below the 45 per cent goal for 1951-1955, and the near doubling achieved between the starvation year 1946 and 1950.

Since the death of Stalin, how-  
*(Turn to page 168, please)*



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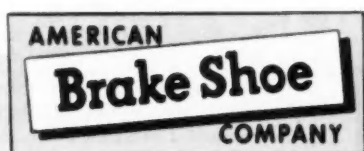
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## RUSSIA'S STRENGTH TODAY

(Continued from page 166)

ever, substantial and rapid improvement of the supply of consumers' goods and housing has been the main domestic propaganda theme. This theme reached a high point in Malenkov's speech at the August session of the Supreme Soviet. It is necessary to distinguish, however, between statements of intent (i.e.,

propaganda statements), evidence of actual intent (i.e., revision of plans), and indications of actual and accomplished redirection of resources in favor of the consumer. There can be no doubt that the new rulers desire to create the impression of a better life to come, and to come soon, under their leadership. It also seems clear that the regime actually intends to accelerate the improvement in consumption standards, although one cannot, of course, assume that the economic plans are being revised in full accord with propaganda statements.

Recent financial developments seem to corroborate that, at least to some extent, the regime's intention is an earnest one. The reduction in prices on consumers' goods of April 1, 1953, was surprisingly large and amounted to an average of about 10 per cent. It was followed by a reduction in half of the compulsory loan subscriptions, which however is expected by the planners to be in part offset by a jump in voluntary savings. Then came a sharp reduction in taxes on peasant households and a considerable increase in the prices paid by the state for warm produce. (However, the last point may redound more to the benefit of the kolkhovy than the peasants as such.) These measures taken together with the normal expansion in the national payroll would seem to increase the purchasing power of the disposable money incomes of the population by 15-18 per cent. If the goods to meet this purchasing power will not be forthcoming, an appreciable repressed inflation may develop.

Considering that ever since 1947 the Soviet have been resolutely combating tendencies toward a repressed inflation, and that the population seems to be quite jittery about monetary stability, as was shown by the Moscow buying panic at the end of June, the regime probably does intend to provide the consumers' goods. And indeed Malenkov has announced that the volume of goods for retail sale is to increase by about 10 per cent in the last nine months of this year, apparently over and above the increase contemplated by his predecessor. There are some hints of release from stockpiles (which may also explain in part the large unspecified residual in planned budgetary receipts), while recent purchases and trade agreements also prominently feature consumers' goods or raw materials for their production (wool, meat, hides, yarn, etc.). However, the reduction of reparations from East Germany, if actually carried out, may act in the opposite direction.

In sum, analysis of the fragmentary data available on the Soviet budget shows a rapidly increasing armaments effort but suggests a shift in emphasis from conventional to atomic arms. This effort has been achieved largely at the expense of consumer welfare, particularly that of the peasants. The new regime, anxious to consolidate itself, has taken significant steps to improve living conditions. How these steps and the armaments effort are to be reconciled remains to be seen.

(Turn to page 170, please)

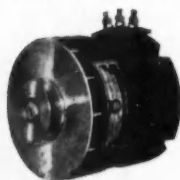
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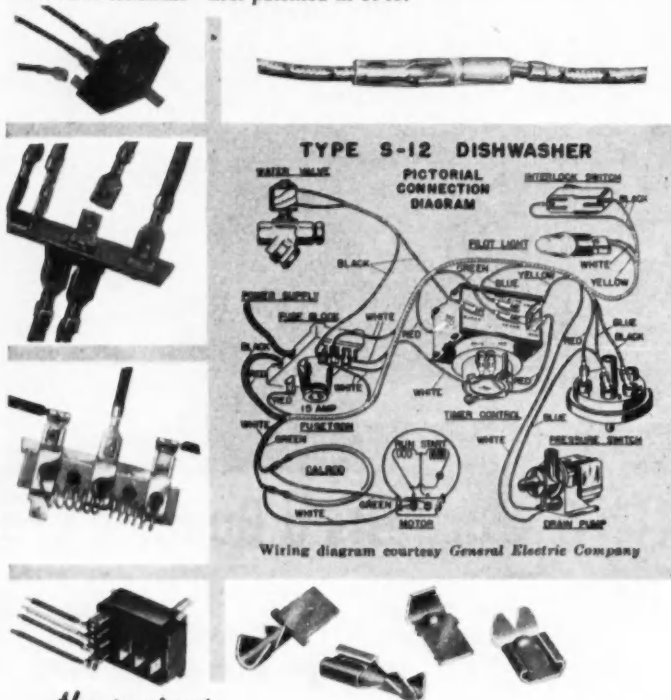
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# RUSSIA'S STRENGTH TODAY

(Continued from page 168)

## Conclusions

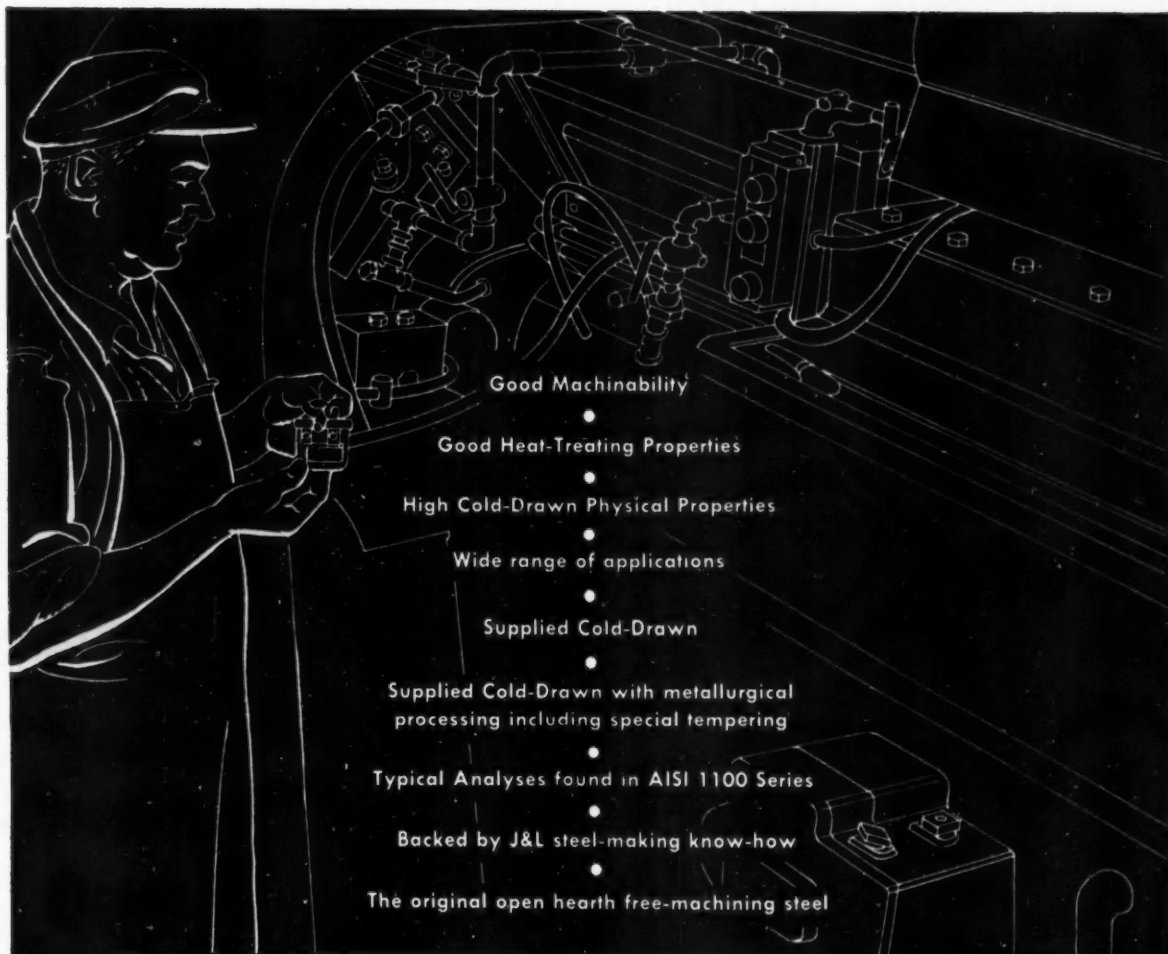
1. The Soviet Fifth Five-Year Plan (1951-1955), while continuing the heavy investment effort of the Fourth (1946-1950), differs from it in sharply increasing rather than decreasing the allotments to armaments as a share of the national product, and in decreasing rather than increasing the share of consumption. It anticipates about a doubling of armaments expenditures and of investment over the current five-year period.

2. Many of the methods by which the Soviets hope to achieve their goals have been carried over from their previous practices. Notable continuities are the long work week, harsh labor discipline, rapid training of technical personnel, and the maximum loading of equipment capacity. Gradual modifications in other aspects of manufacturing technology, with increased emphasis upon rationalizing designs for maximum economy, appear evident. Great stress upon research and development in casting is manifest.

3. The changing methods comprise those of reduced applicability under present circumstances and those newly emphasized. The former include massive additions to the labor force through demobilization, low-cost measures for increasing plant capacity, and the looting of the satellites. The latter include the systematic favoring of the urban sector of the economy at the expense of the collective farmers, a measure implemented by deflation and by special livestock taxes constraining peasant earnings, and by forcing the peasantry to undertake large construction projects on top of their agricultural work. Another new feature is the program of radically modernizing industrial construction. Its major aspects comprise the centralization of construction and design policies under a new high body, Gosstroj; the organization of a special Ministry of Construction; the development of standardized designs (with minimal standards) for all major repetitive types of construction throughout the economy; and the use of "industrial" methods of construction. The large-scale use of earthmoving machinery and of prefabricated elements (manufactured either in special fac-

(Turn to page 174, please)



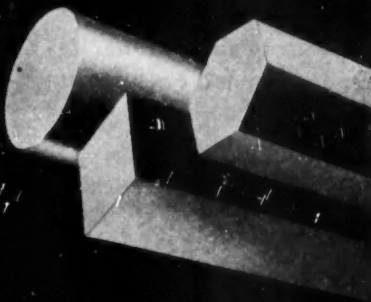


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## RUSSIA'S STRENGTH TODAY

(Continued from page 170)

tories or in special shops at the construction site), the containerization of bulk building materials, and the extensive employment of heavy transportation and hoisting equipment (especially, Soviet-designed demountable tower cranes) distinguish these "industrial" construction methods. Finally, the Soviets are attempting to develop methods, such as induction pre-heating for welding, which would permit them to continue construction even through their severe winters.

4. The actual development of the Soviet economy since 1950 has been marked by the following:

Overall industrial production, as measured by mineral output (and estimated consumption), electric power output, and freight ton-mileage, has risen some 30 per cent in two-and-a-half years, close to plan. Nevertheless, neither civilian producers' nor consumers' goods output has grown accordingly. The inference of increasing pressure from armaments is supported by evidence of extreme shortages in steel-alloying and non-ferrous metals, sheet and plate steel, etc. The lag in the growth of fertilizer output is also suggestive.

Agricultural plans have failed, with only nominal increases achieved in grain and sugar beet output, an actual decline in cotton, and no recent reporting at all in regard to livestock.

Investment, too, is far behind plan. Capital construction, in terms of Soviet indices, has risen only 23 per cent in two-and-a-half years, as opposed to a five-year goal of 90 to 100 per cent. Ceilings on construction personnel, a curious shortage of trained engineers, and difficulties in maintaining new equipment have been among the major problems. In agriculture, not only construction but also the input of new machinery has faltered.

Known increases in the number of workers and employes have not kept pace with the calculated growth of the labor force. The character of employment of this growing residual—over a million today—cannot be established. Within the group of workers and employes, 56 per cent of the increase since 1950 has gone to manufacturing, mining and utilities, with other sectors being held essentially stable. Productivity in both manufacturing and construction has grown rapidly, but far behind the fantastic

(Turn to page 176, please)



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## RUSSIA'S STRENGTH TODAY

(Continued from page 174)

Soviet goals of 50 per cent and 55 per cent, respectively, in five years. Since working hours today are close to maximal, and urban housing and facilities desperately inadequate, the Kremlin faces a major dilemma in this regard.

Finally, examination of both indirect evidence and of the Soviet budg-

ets, 1950-1953, clearly shows that Russia's armament effort over this period has increased close to or above schedule. The current budget indicates a major shift from the expansion of conventional to atomic arms. Armaments and investment combined have taken an increasing share of the national product, while the limited gains in consumers' income have gone to the workers and employes alone. Since the death of Stalin, early in 1953, his successors have attempted to mollify the population, especially the peasants, by broad fiscal measures

promoting a sharp increase in consumption. The conflict between this and the military program is apparent.

\* \* \*

In all, an intense armaments effort is the outstanding characteristic of the Soviet economy today. Despite recent concessions to the consumer, no major relaxation of this effort is in sight. It therefore casts disquieting doubts upon the possibility of continuing world peace, so recently and so shakily brought about. But it is essential to remember that the Soviet empire is not peopled by supermen. Russia's military and industrial gains have been bought at fearful cost, a cost borne most heavily by those peasants who must feed and clothe the nation—and constitute the bulk of her soldiers. The margin of power in the West remains great; wise maintenance and wise use of that power can master the Soviet challenge.

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(Turn to page 198, please)

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## Designed and Fabricated this DILECTO GROMMET

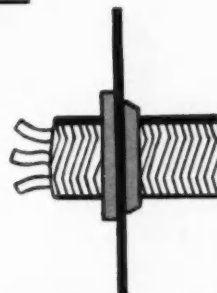


*It springs out and holds tight!*

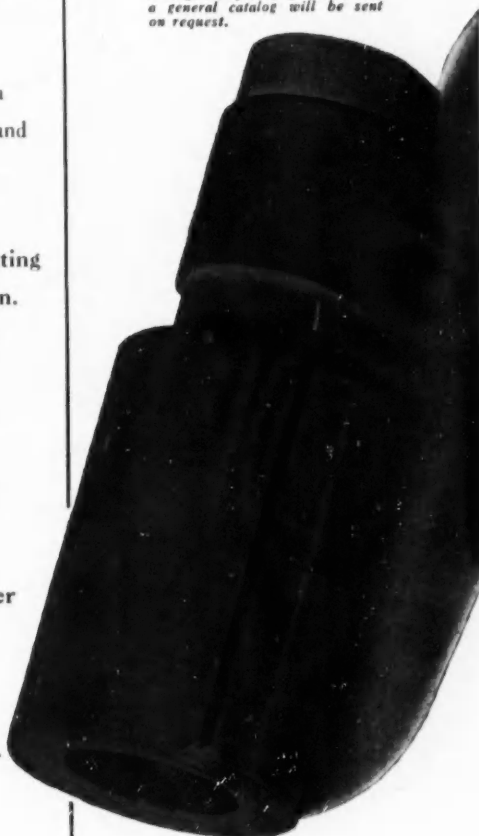
Here's an idea and an example of C-D-F engineering skill teamed up with versatile Dilecto — laminated rolled plastic tubing — that can help you. Thousands of Dilecto grommets are being used in the aircraft industry for wire and cables that pass through bulkheads. Made from fine weave canvas, the C-D-F Dilecto grommet is cut into rings. The rings are grooved and beveled, then slit diagonally. The Dilecto grommet has a built-in tension that permits it to be easily compressed by hand and inserted in the bulkhead. Tension holds it tightly in place. It cushions. It insulates. It reduces assembly time.

**DILECTO** is a C-D-F top quality laminated thermosetting plastic whose uses are limited only by the imagination. Supplied in sheets, rods, tubes, Dilecto answers most electrical and radio needs for a material that is mechanically and dielectrically strong . . . resistant to high heat, hot oil, excessive humidity. It can be punched, stamped, formed and machined to close tolerances. Investigate its possibilities. Available in many grades to meet a variety of requirements. A qualified plastics specialist, your C-D-F sales engineer (offices in principal cities) will help you engineer a better product. Why not call him today!

Another example of a part machined from Dilecto rolled tubing. Notice variety of machining steps and the possible versatility of this mechanically strong material. Only C-D-F makes Dilecto in sheet, tube and rod forms.



*Here's a side-view of a Dilecto grommet, machined to close tolerances from laminated rolled tubing. Sample of grommet and a general catalog will be sent on request.*

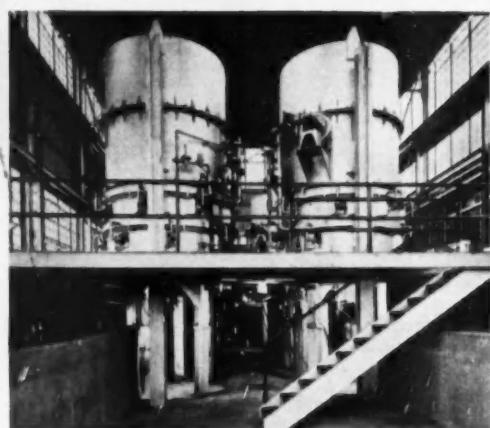
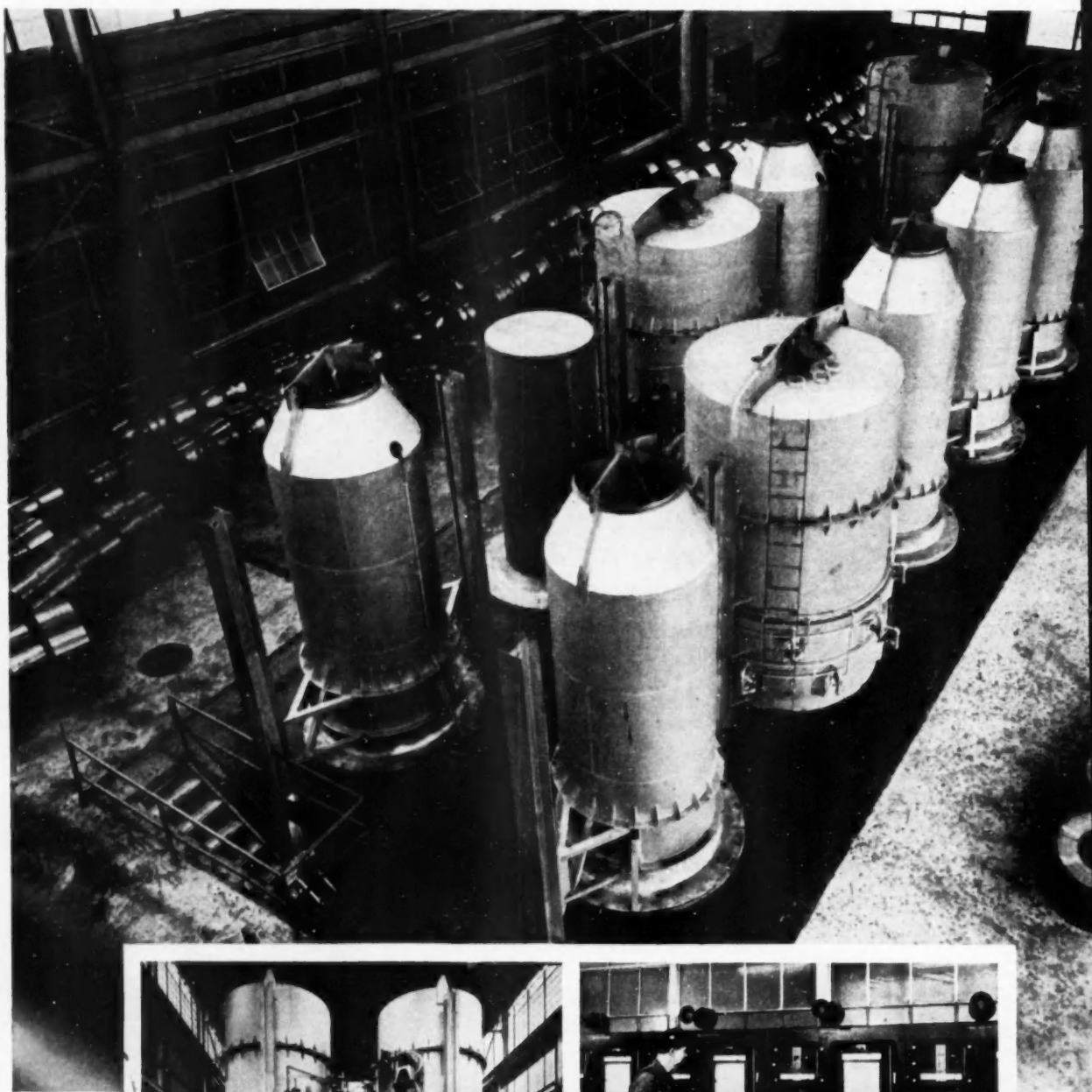


THE NAME TO REMEMBER



DILECTO LAMINATED PLASTIC

*Continental-Diamond Fibre Company*  
NEWARK 2, DELAWARE



This view shows the sub-mounting arrangement of the Westinghouse Cylindrical Bell-Type Furnace bases. This makes motors and controls easily accessible.



These are the pyrometers and mounting panels at the Thompson Wire Co. that control and indicate the temperatures of the furnaces. Note alarm horns.





## **"Westinghouse Furnaces stepped up our production" ... says Thompson Wire Co.**

Thompson Wire Co. is now using four *Gas-Fired* Westinghouse Cylindrical Bell-Type Furnaces, 12 bases, 12 inner hoods, and 8 air-cooling hoods. A fan, mounted on top of each cooling hood, draws air between the work hood and cooling hood, exhausting heated air to the top, thus accelerating cooling of the charge.

This entire new operation has given Thompson Wire Co., greater load per heat, faster cooling, less maintenance costs and increased production.

Investigate Westinghouse Heat-Treating Furnaces with an eye toward cutting costs and increasing capacity.

For more information regarding Westinghouse Heat-Treating Furnaces, write or call your nearby Westinghouse office. Westinghouse Electric Corporation, Industrial Heating Department, Meadville, Pa.

J-10386

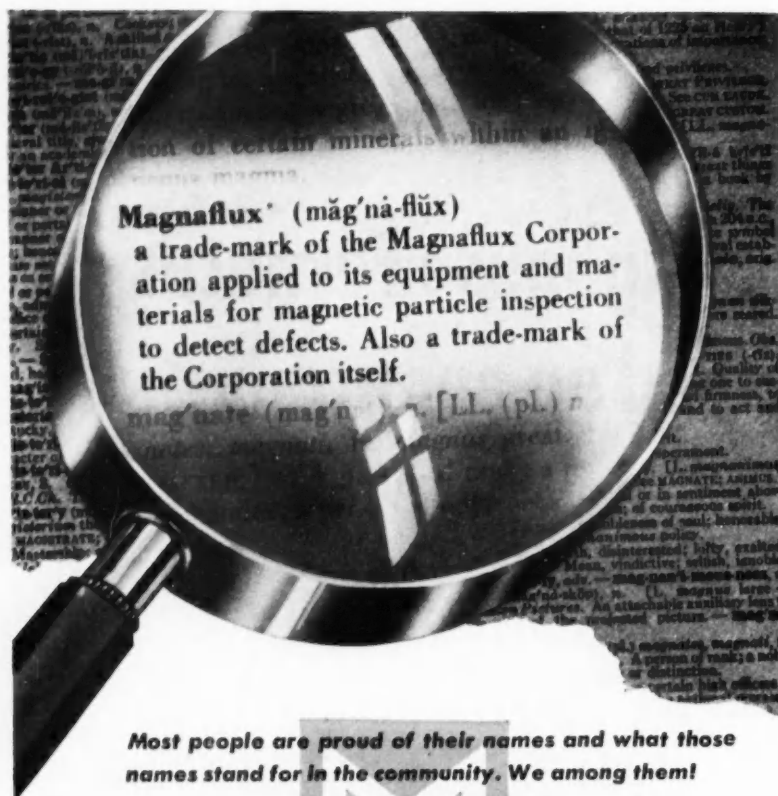
YOU CAN BE **SURE**... IF IT'S  
**Westinghouse**



You are invited to visit our Booth Number 1611 at the 35th annual Metal Exposition, held in the Public Auditorium, Cleveland, Ohio, Oct. 19 through the 23, 1953. We will be featuring our new Shaker Hearth Furnace.



**IF YOUR PRODUCT CALLS FOR HEAT-TREATING...IT CALLS FOR  
A WESTINGHOUSE FURNACE ...GAS OR ELECTRIC**



Most people are proud of their names and what those names stand for in the community. We among them!

## MAGNAFLUX\*

is a Trade Mark

Magnaflux Corporation pioneered non-destructive testing with inspection methods to detect defects that give industry low cost means to insure dependable quality. Result: better products at lower cost turned out with less waste, for more people.

Magnaglo\* and Zyglo\* and certain other names are also trade-marks registered by us. They have become recognized symbols, for inspection equipment developed and sold by Magnaflux Corporation—used by more industries, for more inspection operations than all other methods combined!

But "Magnaflux"\* stands for even more than this. For users of Magnaflux\*, it stands for unlimited co-operation, counsel and research in non-destructive testing methods. It stands for the personal help of trained non-destructive testing engineers—for instruction schools and providing new information. All this is part of our service.

If you'd like to know more about Magnaflux Corporation—its people and its methods—write for the booklet "Seeing Isn't Always Believing." Hundreds of businessmen and executives have found it interesting reading.



**MAGNAFLUX\***

\*Registered U.S. Patent Office



**MAGNAFLUX CORPORATION**

7304 West Lawrence Avenue, Chicago 21, Illinois

What's New at the

## ● National Metal Show ●

For additional information please use postage-free reply card on page 81

(Continued from page 64)

### Surface Roughness Gage

One highlight of the company's display will be the Surfindicator gage for simplifying the measurement of surface roughness. It is a portable tool that can be used anywhere on the production line and operated by shop personnel.

When the diamond tip stylus of the unit moves across the peaks and valleys of a machined surface, the microscopic mechanical motion is transformed by a movable plate vacuum tube transducer into electrical signals. These signals are amplified and indicated on the meter as surface roughness in arithmetical average microinches. *Brush Electronics Co., Booth 1220.*

Circle 65 on page 81 for more data



Brush Electronic surface roughness gage.

### Welding Cable Connector

On display is a welding cable connector made of solid brass machined to a smooth sliding fit. The design consists of a double cam principle where one cam exerts pressure parallel to the axis of the connector, the other perpendicular to the axis. Contact approaching the 600 lb per sq in. needed for minimum resistance is obtained.

General-purpose connectors (for 1/0 through 3/0 cable and No. 2 (Turn to page 182, please)

**over 1,000**

**SPECIALIZED WELDING GUNS  
FROM ONE PROGRESSIVE  
STANDARDIZED MODEL**

GC 11-26 HYDRAULIC

GC 11-12 AIR

PROGRESSIVE'S EXCLUSIVE  
NYLON GUIDE

- Constant guide and support throughout stroke
- Self-insulating
- Resists weld spatter
- No lubrication required

Both Progressive guns in the above illustration have the same chassis—the difference is in the interchangeable cylinders, jaw extensions, electrode adapters, and tips.

Using Progressive's original Standardized Chassis and interchangeable parts, job-specialized portable welding guns can be made for a fraction of the cost of specially-designed guns.

Progressive has more portable guns in use than all other manufacturers combined. For information on any type of Special or Standard Portable Gun—write to Progressive in care of Department G.

**The PROGRESSIVE**

3070 E. OUTER DRIVE • DETROIT 34, MICHIGAN

*Welder Sales Company*

Group of special jaw designs demonstrating wide versatility of Progressive Welding Guns.

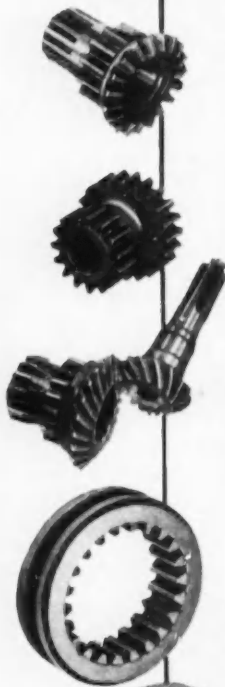


Check  
with

# FAIRFIELD

For FINE  
GEARS

✓	TOP QUALITY
✓	MASS PRODUCTION ECONOMY
✓	DEPENDABLE SERVICE
✓	UNEXCELLED FACILITIES
✓	ENGINEERING RECOMMENDATIONS



## FAIRFIELD

MANUFACTURING CO.

2303 S. Concord Road

Lafayette, Indiana

● Large or small, you get the benefits of high production rates and big volume output at FAIRFIELD—the place where fine gears are produced EFFICIENTLY and ECONOMICALLY to meet your specifications. For more than thirty years, Fairfield has been one of America's largest independent producers of precision-cut, automotive type gears and a DEPENDABLE SOURCE OF SUPPLY for customers throughout the country.

Get acquainted with the service Fairfield offers—unexcelled facilities in a new and ultramodern plant for producing Spur, Herringbone, Spiral Bevel, Straight Bevel, Hypoid, Zerol, Worms and Worm Gears, Splined Shafts, and Differentials in a wide range of sizes and capacities.

**ENGINEERING SERVICE**—Fairfield engineers are qualified to make expert recommendations on your gear production requirements. *Inquiries are invited.*

*Fine Gears Made to Order for:*

TRACTORS • CONSTRUCTION MACHINERY • ENGINES  
BUSES • FARM IMPLEMENTS • MINING MACHINERY  
DIESEL LOCOMOTIVES • MACHINE TOOLS • AIRPLANES  
HEAVY DUTY TRUCKS • OIL FIELD EQUIPMENT

What's New at the

## ● National Metal Show ●

For additional information please use  
postage-free reply card on page 81

(Continued from page 180)



Cam-Lok welding cable connector.

through 1/0 whip ends) are interchangeable with heavy-duty connectors and with general-purpose and heavy-duty female terminal connectors. Long runs of cable can be graduated from 4/0 down to a light whip end for maximum flexibility and minimum voltage drop. No adaptors or reducers are needed.

The connector is self-compensating for wear, locks tight, releases easily, has no spring action, and is said to reduce arcing and burning to a minimum. *Cam-Lok Div., Empire Products, Inc., Booth 1634.*

Circle 66 on page 81 for more data

## Milling Machine

Featured will be a line of Hercules No. 2 precision milling machines. Manufactured in Denmark, they are built to American standards and are equally well suited for tool room work as for production, according to the U. S. distributor.

Plain, universal and vertical types are available, and all feature a sliding support column for front end of the knee, which can be clamped in any position for increased rigidity. Hardened and ground gears are used throughout, and the milling spindle runs in adjustable roller bearings. Column and knee ways are also hardened and ground.

Machines are equipped for power rapid traverse in all three directions, and the table feed and rapid traverse are all controlled by a single lever. Electro-dynamic braking provides quick stopping action. Weight of the table, saddle, and knee is counterbalanced by a heavy coil spring inside the support column.

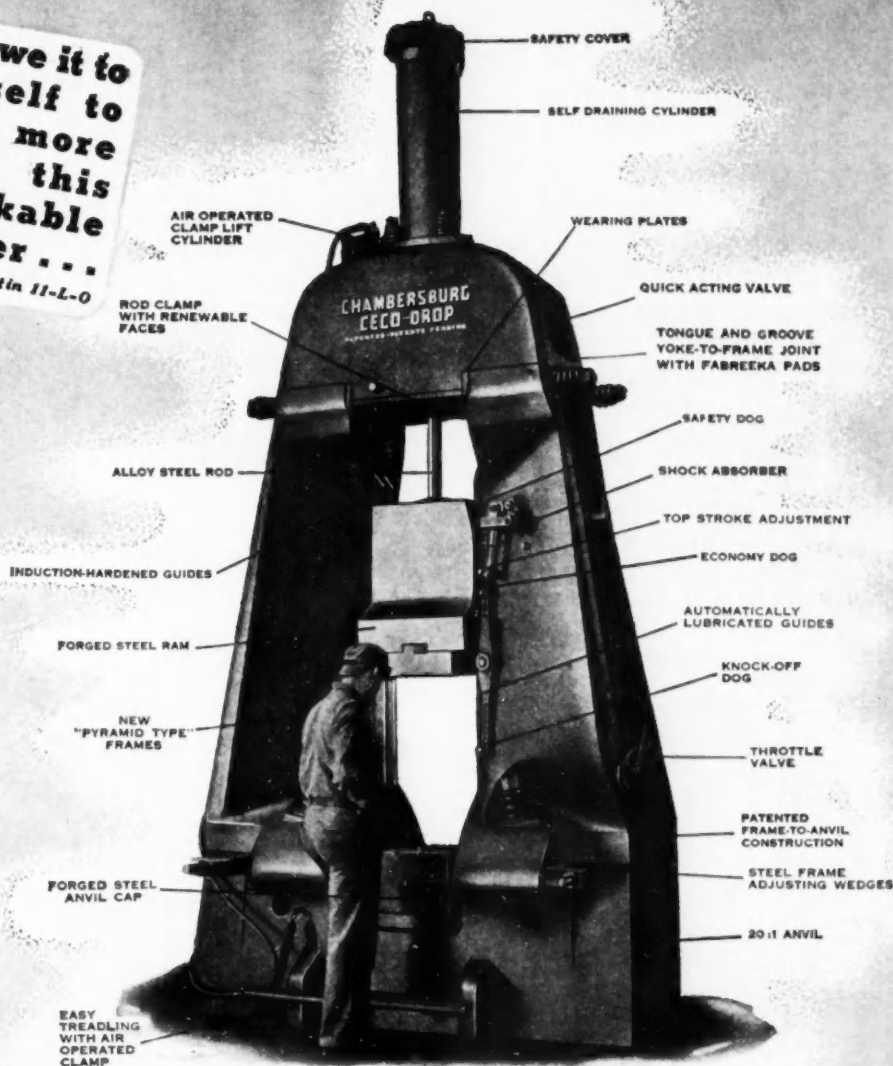
The machines also feature automatic lubrication by separate built-in oil pumps. The drive is so arranged to the spiral dividing head that rotation of the dividing head spindle while the table is at rest is permitted. This

(Turn to page 188, please)



**You owe it to  
yourself to  
learn more  
about this  
remarkable  
hammer . . .**

*Write for Bulletin 11-L-0*



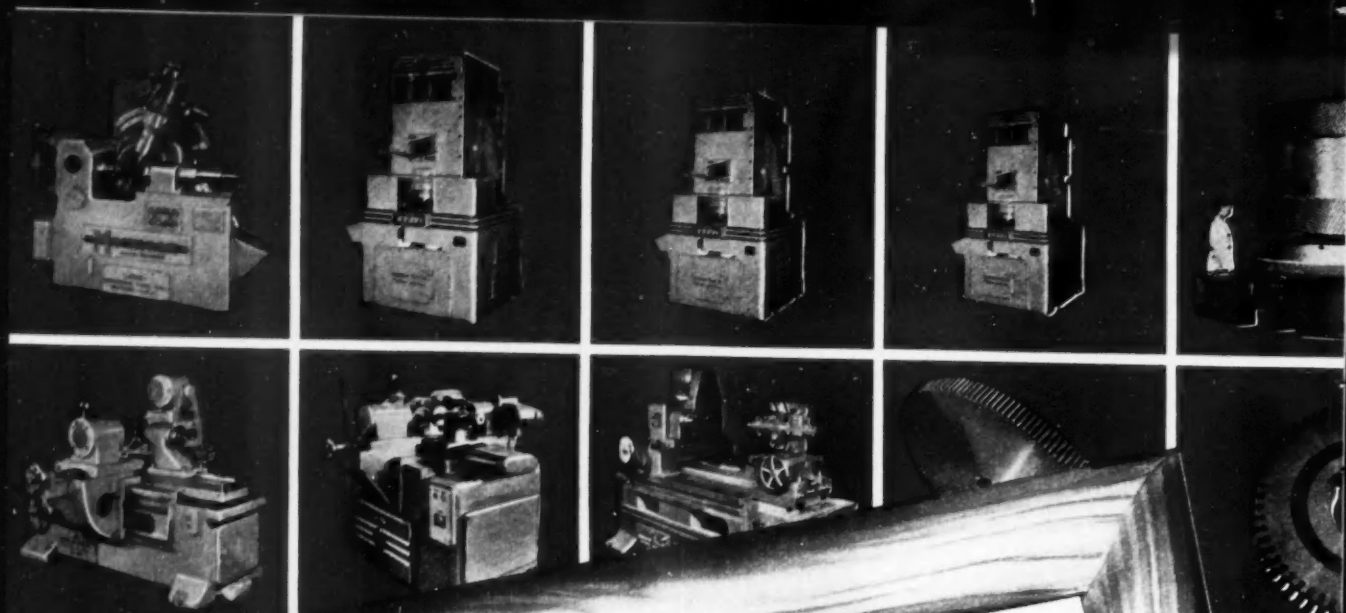
# CECO-DROP

## • *The Boardless Gravity Drop Hammer* •

**No Boards • No Front Rod • No Back Rod  
Costs less to operate . . . Forges more minutes  
per hour . . . Is safer and easier to operate . . .  
This hammer is setting new records in cutting  
forging costs and in increasing production.**

**CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.**



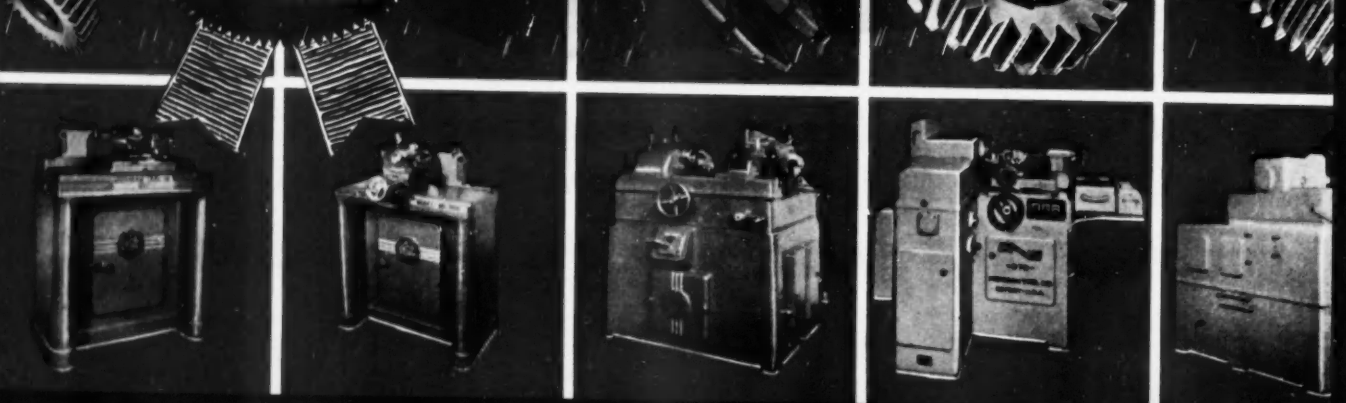


**GEAR CUTTING  
GEAR FINISHING**

**Complete Equipment  
For Gear Production**

**1458 Ultra Speed Gear Hobber**

**GEAR LAPPING  
GEAR CHECKING**



.....headline in  
Production Engineering  
& Management  
January, 1953

# "FORD Hobs Gears 350% Faster"

We've checked on it and the editors of PRODUCTION ENGINEERING & MANAGEMENT are right. At Ford Motor Company  $3\frac{1}{8}$ " diameter, 9-pitch,  $1\frac{1}{2}$ " face width transmission gears are being hobbled at a production rate 350% greater per spindle than compared with multiple spindle machines. To do this Ford uses one of the new Michigan Ultra-Speed gear hobbors equipped with double thread accurate unground Michigan hobs. Gears are hobbled two at a time, 58 seconds per pair.

Despite the high output rate, 225 gears are produced per sharpening of the hob. Among the reasons given are that "the machine is of rugged, compact construction, simplified in design, with few gears for the index and main drive and . . . with a maximum spindle speed of 1000 rpm."

Of interest is that better control of surface finish is obtained by easier subsequent shaving. Loading and unloading time is kept to a minimum by hydraulically-actuated expanding arbors. Vibration has been practically eliminated by providing maximum rigidity plus a flywheel to dampen torsional vibration.

For further details, write for Bulletin #1458-52.

## GEAR PRODUCTION HEADQUARTERS



7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.

# CALENDAR

## OF COMING SHOWS AND MEETINGS

35th National Metal Congress and Exposition, Cleveland, O. . . . Oct. 17-23  
Society of Industrial Packaging and Materials Handling Engineers, annual meeting and exposition, Boston, Mass. . . . . Oct. 19-22  
41st National Safety Congress and Exposition, Chicago, Ill. . . . Oct. 19-23

38th International Motor Show, Earls Court, London . . . . Oct. 21-31  
American Gear Manufacturers Association Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Ill. . . . . Oct. 25-28  
International Motorama Exposition, Los Angeles, Calif. . . . Oct. 26-Nov. 1  
Manufacturing Conference, American Management Association, Bellevue-Stratford Hotel, Philadelphia, Pa. . . . . Oct. 28-30  
American Society of Body Engineers, 7th annual technical convention, Rockham Bldg., Detroit, Mich. . . . . Oct. 28-30

SAE International Production Meeting, Royal York Hotel, Toronto, Canada . . . . . Oct. 29-30  
American Society of Tool Engineers, semi-annual membership and board meeting, Dayton Biltmore Hotel, Dayton, O. . . . . Oct. 30-31  
SAE National Transportation Meeting, Conrad Hilton Hotel, Chicago, Ill. . . . . Nov. 2-4  
SAE National Diesel Engine Meeting, Conrad Hilton Hotel, Chicago, Ill. . . . . Nov. 3-4  
Vickers' Third Transport Aircraft Hydraulic Conference, Park Shelton, Detroit, Mich. . . . Nov. 3-4  
SAE National Fuels and Lubricants Meeting, Conrad Hilton Hotel, Chicago, Ill. . . . . Nov. 4-6  
17th Annual Time and Motion Study and Management Clinic, Industrial Management Society, Sheraton Hotel, Chicago, Ill. Nov. 4-6  
Refrigeration and Air Conditioning Exposition, Public Auditorium, Cleveland, O. . . . . Nov. 9-12  
American Petroleum Institute Meeting, Hilton Hotel, Chicago, Ill. Nov. 9-12  
Montreal Materials Handling, Tool and Industrial Equipment Shows, Show Mart, Montreal, Que. . . . . Nov. 9-13  
Association of American Battery Manufacturers, Fall Meeting, Edgewater Beach Hotel, Chicago, Ill. . . . . Nov. 16-18  
Fourth Pan American Road Race, Mexico . . . . . Nov. 19-23  
American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York, N. Y. Nov. 29-Dec. 4  
American Society of Agricultural Engineers, winter meeting, Edgewater Beach Hotel, Chicago, Ill. . . . . Dec. 7-9

1954

SAE Annual Meeting, Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Mich. . . . . Jan. 11-15  
National Motor Boat Show, Bronx, N. Y. . . . . Jan. 15-23  
Society of Plastic Engineers, 10th annual technical conference, Royal York Hotel, Toronto, Ont. . . . . Jan. 27-29  
National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. . . . Feb. 17-19  
SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. . . . March 2-4



# JOHNSON

## *Tappets*

"fill the exacting requirements of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.



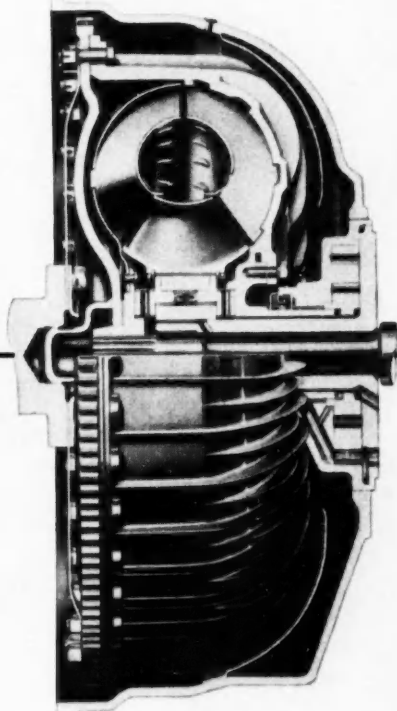
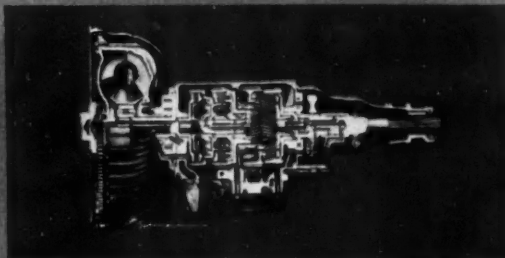
"Tappets are our business"

**JOHNSON *Jp* PRODUCTS**  
INC.  
MUSKEGON, MICHIGAN



the new  
**BORG & BECK**  
TORQUE  
CONVERTER

*used in Fordomatic and Merc-O-Matic transmissions*



An air-cooled Torque Converter of unique design with steel blades assembled in die-cast aluminum Impeller whose 68 fins provide swift cooling.

The Turbine is made of steel stampings and the Stator is aluminum. Its One-Way 20 sprag clutch is Borg-Warner's well-proved design.

Light in weight, with a torque ratio of 2.1:1, it has excellent efficiency, yet it can be readily disassembled in the field for inspection or repair.

**BORG & BECK DIVISION**

BORG - WARNER CORPORATION

Chicago 38, Illinois



# COOLIDGE BALLS

CHROME ALLOY  
STAINLESS STEEL

*Finest:*

ELECTRIC FURNACE STEEL  
HEAT TREATMENT  
LAPPED FINISHES

THESE FACTORS COMBINE TO MAKE THE FINEST  
STEEL BALLS OBTAINABLE BECAUSE THEY CON-  
TRIBUTE TO CLOSER SURFACE UNIFORMITY—  
BETTER STRAIN DISTRIBUTION—HIGHER LOAD  
CARRYING CAPACITY—LONGER LIFE

*Used in:*

BALL BEARINGS • AUTOMOTIVE • AIRCRAFT  
FARM AND INDUSTRIAL EQUIPMENT  
MACHINE TOOL • OIL WELL AND OTHER  
IMPORTANT APPLICATIONS

COOLIDGE  
CORPORATION  
BOX 488 • MIDDLETOWN, OHIO

What's New at the

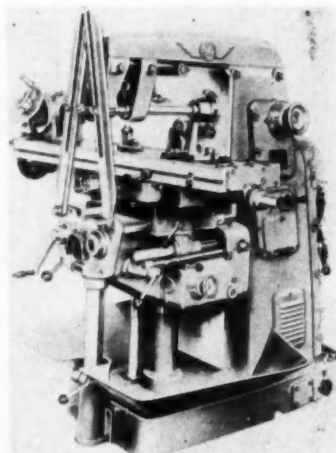
## ● National Metal Show ●

For additional information please use  
postage-free reply card on page 81

(Continued from page 182)

permits milling of ring grooves, bayonet lock grooves, and similar shapes. Milling spindle has American standard spindle nose No. 50, and the front bearing is of the double row, adjustable roller type, SKF-NN3015K. All feed dials read in .001 in. *Parker Machine Co., Inc., Booth 1932.*

Circle 67 on page 81 for more data



*Parker-distributed Hercules milling machine.*

### Stepless Temperature Control

A temperature controller to be shown is said to give unusually close control. The stepless controller supplies only enough power to the heating element to hold the temperature for which it is set. The heater only operates at full power on the initial temperature rise.

The true temperature is indicated at all times on a five in. scale, mirrored for parallax correction. Two sections make up the complete controller, except in the higher capacity units where intermediate amplification is necessary.

One section contains the temperature indicator, parts of the instrument control circuit and the control pilot lights, while the other contains the heavier parts of the controller

(Turn to page 190, please)

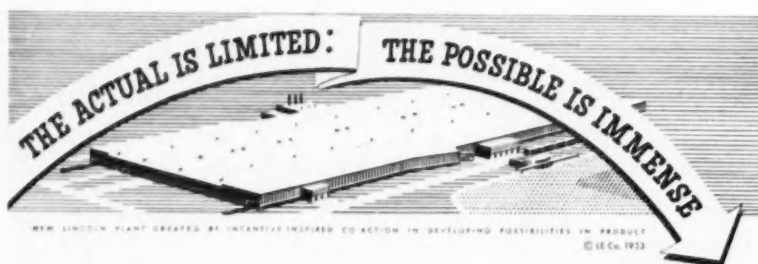


- SCREWS, BOLTS AND NUTS in over 10,000 standard sizes, types, head styles and finishes. Special cold headed fasteners and other products.

# pheoll

## standard special

**PHEOLL MANUFACTURING CO.**  
5700 ROOSEVELT ROAD, CHICAGO 50, ILL.



## AUTOMATIC LINCOLNWELD SOLVES ASSEMBLY DILEMMA

**Welds 100 inches per minute  
completes 32 units per hour**

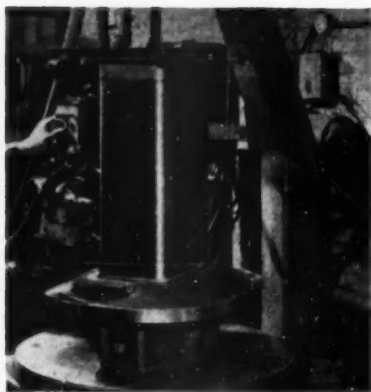
**PROBLEM . . .** to fabricate oblong containers 24" high, 12" by 18" at the base. Sides are 16 gauge formed on tangent bender. Top and bottom are 13 gauge stampings. All welds must be pressure tight; assembly galvanized before final inspection.

**METHOD . . .** the side wrap-around is first seam welded after spot tacking to insure right dimensions for top and bottom recessed heads. Heads are stampings, pressed in position using hydraulic ram and spot-tacked. Assembly is then automatic welded with "Lincolnweld" head set at 15 degrees to horizontal, providing benefit of fast 3 o'clock welding at 100 inches per minute. "Lincolnweld" head is cam guided and moves in and out radially as the fixture rotates.

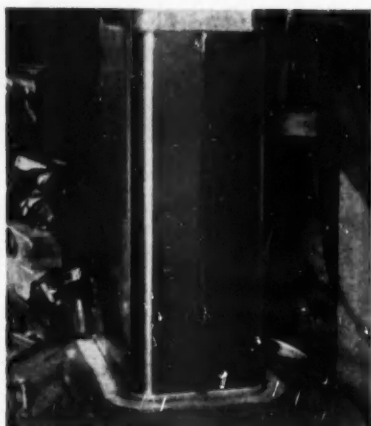
**RESULTS . . .** each assembly has two peripheral welds. Production averages 31 to 32 units an hour. Using small electrode and high current, welds are smooth, uniform, and ductile. Rejections are nil.

**LOOK TO LINCOLN.** New developments for speeding production, improving quality of product today can save manhour and money. Complete Automatic Welding Service . . . machines, electrodes, fluxes, engineering . . . is available from one source . . . Lincoln.

See your nearest representative now or write Dept. 2205. Bulletins on cutting welding costs with "Automatic Lincolnweld" are available by writing on your letterhead.



**Fig. 1. Automatic Setup** for mass producing metal containers. Spot tacked assembly is held in vertical clamp and peripheral weld made with "Automatic Lincolnweld" at 100 inches per minute. Production of two welds per assembly is 31 to 32 units per hour with automatic push button operation.



**Fig. 2. Welds are smooth, uniform, and ductile.** Copper ring forms flux dam. Unused flux is reclaimed with vacuum recovery.

### THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

What's New at the

## ● National Metal Show ●

For additional information please use  
postage-free reply card on page 81

(Continued from page 188)

circuit. A six conductor cable, which is supplied, connects the two sections.

The separation of the control unit from the indicator unit facilitates panel mounting of the indicator unit. West Instrument Corp., Booth 2719.

Circle 68 on page 81 for more data



West stepless temperature controller.

### Iron and Steel Cleaner

Among the materials to be featured is Composition No. 26 for removing extra-heavy soils from iron and steel in one operation. The compound combines the heavy-duty cleaning action of both alkaline and solvent-type cleaners and also contains surface active agents.

The material is said to possess a marked ability to wet and penetrate heavy soils rapidly, efficiently loosening them so that a rinse then leaves work surfaces thoroughly clean. Tank cleaning of engine blocks and small parts are among the recommended applications of this material. Oakite Products, Inc., Booth 2573.

Circle 69 on page 81 for more data

### Electrode for Quick Pre-Heating

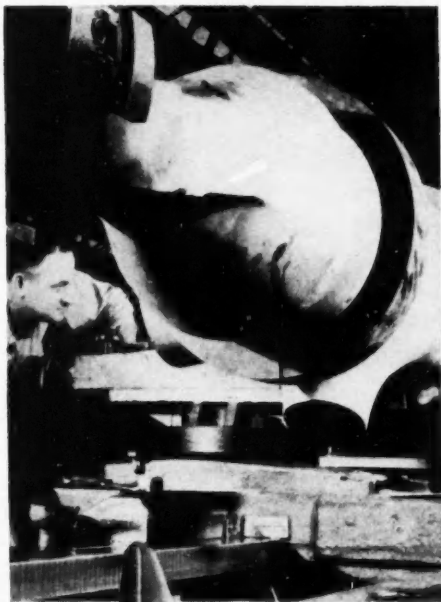
For quick heating, for annealing, heat treating, softening, burning off paint, and pre-heating, an electrode has been developed called ThermoTrode. The ThermoTrode is inserted in an ordinary electrode holder of a d-c arc welder and is ready to work.

The steel core electrode features a specially developed patented flux which is said to establish a unique type of arc. Instead of depositing the metal, you actually oxidize it with a blast so that the core metal disintegrates into a powder.

ThermoTrode's sharp heat cone generates a tremendous amount of

(Turn to page 192, please)

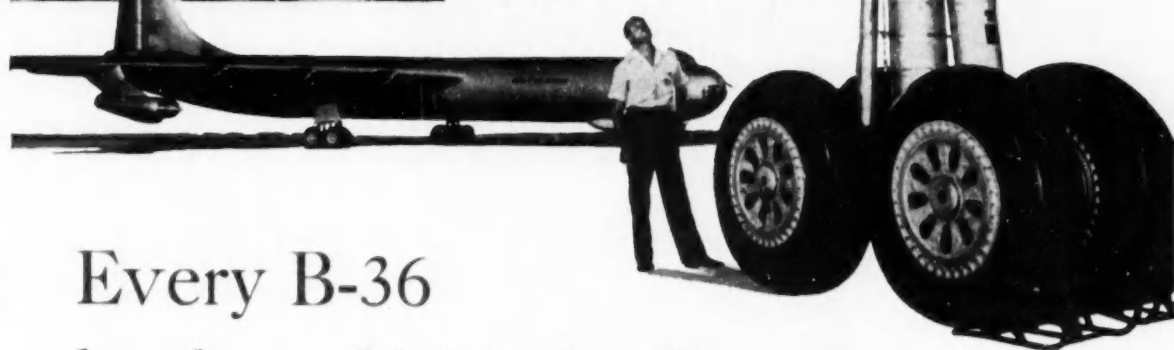




U-S-S CARILLOY electric-furnace aircraft quality steel meets every requirement for these vital parts. The precision machining and expert heat treatment they get at Cleveland Pneumatic Tool Company complete the job.



NO ORDINARY STEEL could withstand the huge shock loads imposed on the main landing gears of Convair's giant Air Force B-36 Bomber. The plane has a maximum gross weight of 358,000 lbs., with still higher landing shock loads. But U-S-S CARILLOY steel has more than enough impact strength to hold up under this severe punishment.



## Every B-36 lands on U-S-S Carilloy Steel

WHEN 179 tons of B-36 thump down on a landing strip, tremendous stresses are built up in the structural parts of the landing gear. Only the highest quality in steel can handle this tough job, which is one of the most exacting in the aircraft industry.

All of the rugged main columns for these landing gears are made from U-S-S CARILLOY electric-furnace aircraft quality ingots. This high quality alloy steel provides the

great strength and shock resistance demanded in the performance of the finished part. The main columns for these landing gears are forged. The original ingot, as shipped to the forger, weighs approximately 37,500 lbs. From it are produced two columns, each weighing about 1200 lbs. In other words, approximately 93% of the steel has been removed—with a mere 7% of the original ingot left to do this tremendous job. Obviously, only steel of the very best quality can

meet such exacting requirements.

The same care and skill go into every ton of CARILLOY steel that you buy, whether it's a giant alloy ingot or a few tons of special steel. Our experienced metallurgists keep a close check on every heat of steel to make sure it has the strength, hardness, toughness and machinability that's needed.

If you have a special steel problem, let us know. We'll be glad to help you with it.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



# Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

3-1216

UNITED STATES STEEL

For additional information please use postage-free reply card on page 81

(Continued from page 190)

heat which may be relayed by maintenance of proper arc distance or by using a circular or weaving motion as the rod is applied. Thus you can establish a great heat in a very short

time, the manufacturer claims, yet operate over a wide area.

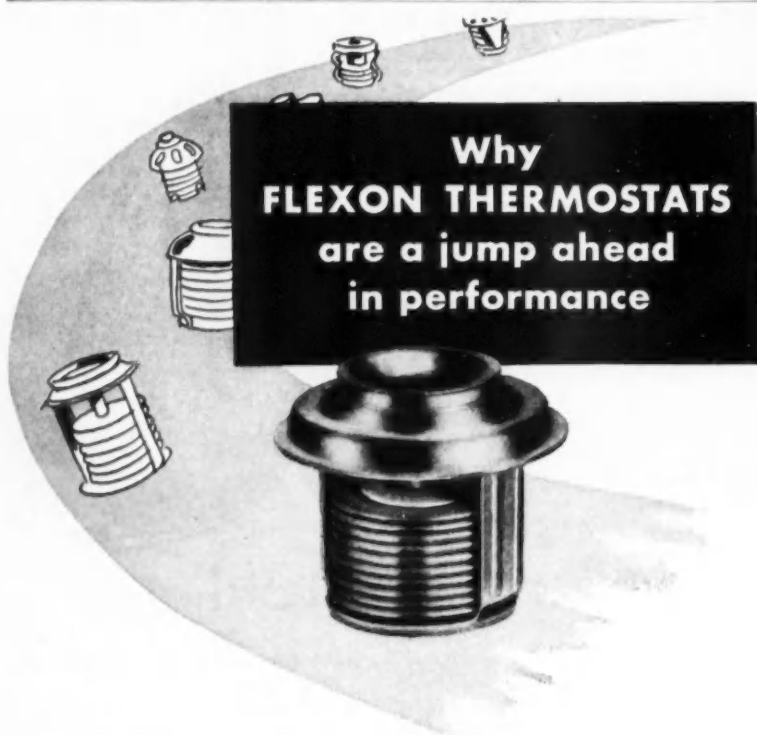
ThermoTrade is said to be adapted to practically every phase of welding operation where a concentrated heat



Eutectic pre-heating electrode in operation.

source is needed. Available in  $\frac{1}{8}$  in.,  $\frac{5}{32}$  in. and, for heavy work,  $\frac{3}{16}$  in. diameters. Eutectic Welding Alloys Corp., Booth 1606.

Circle 70 on page 81 for more data



Flexon Thermostats have set new automotive standards for accuracy and dependability because of the Integral Stem Guide. The guide, integral with the top plate, is a structural aligning device that maintains precision centering of the stem and positive seating of the valve, thus assuring trouble-free performance in operation. No other bellows type thermostat offers this feature.

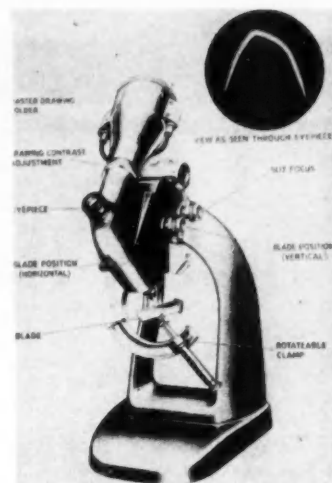
Flexon Thermostats are the quality product of a reputable manufacturer with over 50 years fabricating experience in instrument bellows, precision aircraft components and related items. We would welcome the opportunity to discuss your needs with you and demonstrate what Flexonics Corporation can do for you. Write, wire or phone to have your Flexonics sales engineer call.

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Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.



FORMERLY CHICAGO METAL HOSE CORPORATION  
Manufacturers of flexible metal hose and conduit, expansion joints, metallic bellows and assemblies of these components.  
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario



### Blade Microscope

The microscope, illustrated, for checking the correctness of leading and trailing edges of jet engine blades and buckets will be displayed. Master drawings are said to be quickly interchangeable. The holder for the gas turbine blade is furnished. Engis Equipment Co., Booth 142.

Circle 71 on page 81 for more data

### Carbide Tool Grinder

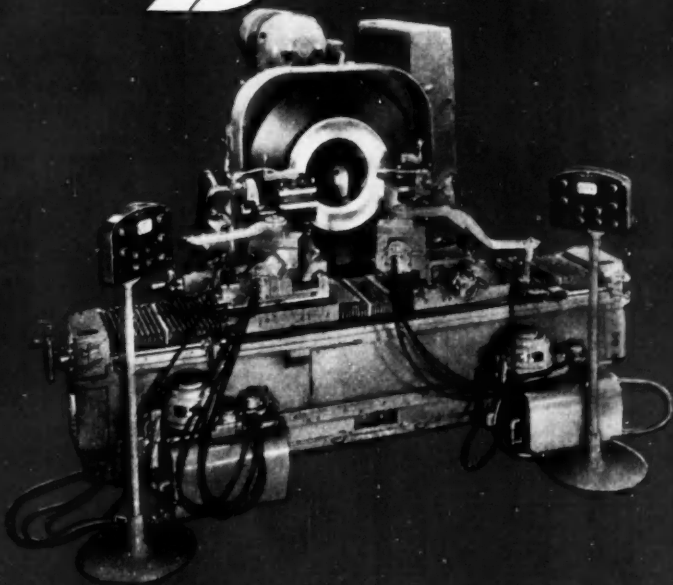
On exhibition will be Model WD-6 wet or dry carbide tool grinder. This machine has the following specifications:  $\frac{1}{2}$ -hp drive motor, arranged to use six-in. diam cup wheels; self-contained pump and tank unit in the base; in and out table adjustment accomplished by a screw feed and not manually slid; safety cup wheel disk on both

(Turn to page 194, please)

**MORE AIRCRAFT...**

**thanks to Monarch**

**AIR  
CRAFT**



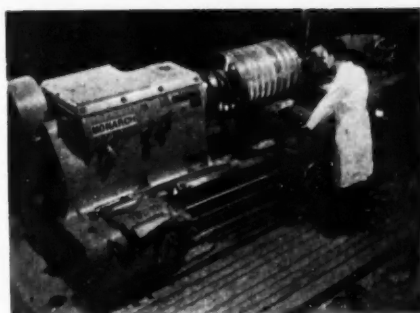
The Monarch 60" Right Angle Lathe, Model G, principally for turning and boring, features two slides, either or both of which can be Air-Gage Tracer controlled. Model F, with single slide and constant surface cutting speed, is principally for facing.

## **Monarch Lathes with Air-Gage Tracer Controls Speed Jet Engine Production**

High output, and extremely accurate output, are two advantages that these dissimilar Monarch turning machines both possess in common. Each is controlled by the Monarch Air-Gage Tracer—and no other duplicating method yet devised surpasses it in speed of accurate output.

The Monarch 60" Right Angle Lathe, used principally for jet engine production today, is ideal for any thin-walled work piece with large diameter. The 32" Model NN Heavy Duty Lathe is shown contouring a rotor assembly—one of the most exacting operations in jet aircraft production. Yet it has all the size, power and rigidity, when needed, to hog heavy cuts from big work.

Whatever your turning, facing or boring job may be, you'll find in the complete Monarch line the lathe to produce it better, faster, more economically. *Three* different duplicating devices are applicable. And the whole story—with pictures, specifications and job reports—is instantly available to you in our complete brochures. Write for yours today! . . . *The Monarch Machine Tool Co., Sidney, Ohio.*



Monarch 32" Model NN Heavy Duty Lathe with swivelling Air-Gage Tracer. Machine may be used for a wide variety of turning, boring or facing operations—under tracer or conventional manual control.

**Monarch**  
TURNING MACHINES



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INCREASE PRODUCTION • CUT COSTS • IMPROVE QUALITY

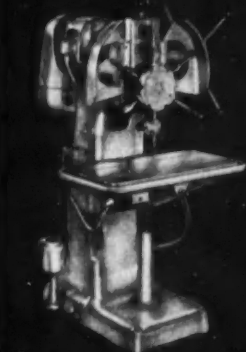
# Burgmaster

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... now available in 3 models

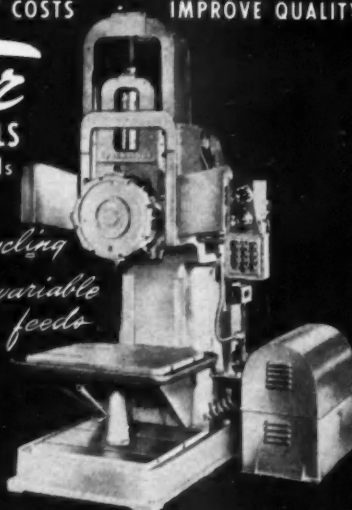


**6 SPINDLE MODEL 2BH**  
AUTOMATIC • HYDRAULIC



**6 SPINDLE MODEL 2A**  
MANUAL

*skip-indexing  
automatic cycling  
infinitely variable  
preselective feeds*



**8 SPINDLE MODEL 3BH**  
AUTOMATIC • HYDRAULIC

## SPECIFICATIONS

	MODEL 3BH	MODEL 2BH	MODEL 2A
Drill capacity, mild steel	1 1/4"	3/4"	3/8"
Ram travel	12"	8"	8"
Spindle speeds, preselective	12	12	12
Speed range	115-1700	225-3000	225-3000
Depth control	Preselective	Preselective	Preselective
Throat depth	19 1/8"	12"	12"
Table work surface	25" x 35"	17" x 34"	17" x 34"
Table travel	19"	19"	19"
Max. clearance, spindle to table	32"	23"	23"
Max. diameter tool clearance	9"	4 1/2"	4 1/2"
Motor, 2-speed, 1800/900	10/5 H.P.	2/1 H.P.	2/1 H.P.
Weight, approximate	7000 lbs.	2500 lbs.	1800 lbs.
Height	120"	78"	72"
Floor space, approximate	6'6" x 5'4"	6'0" x 5'1"	38" x 5'1"



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What's New at the

## • National Metal Show •

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(Continued from page 192)

ends of the machine to prevent the operator from accidentally dropping a tool into the cup of the wheel; and guards and pans to keep the coolant off the operator and the floor; and combination protractor and wheel dresser included as standard equipment. **Hammond Machinery Builders, Inc., Booth 1150.**

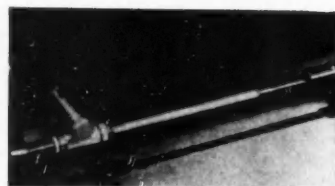
Circle 72 on page 81 for more data



Hammond tool grinder.

## Surface Gage

A line of six Profilometer LE-type tracers for taking surface roughness measurements in holes as small as 1/2 in. ID, as deep as 24 in., and from one to 75 microinches roughness will be shown.



Micrometrical Profilometer

In order to enter small, deep holes, these tracers have an integral Link-arm or stiffarm, each available in three standard lengths for measuring

(Turn to page 196, please)

## HERE'S Tool-flex

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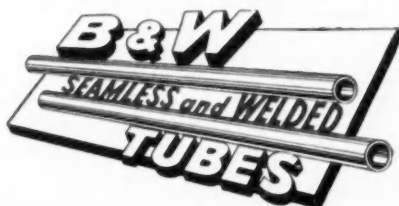


It would be difficult indeed to name any round hollow part or structural assembly that can't be *machined* or *formed* out of B&W Mechanical Tubing — at worthwhile economies in time, costs and materials. It will pay you, as it has so many others, to look into its great versatility and the opportunities it affords for cutting production expense and improving product quality.

B&W Mechanical Tubing—both seamless and welded

— is available in stainless, alloy and carbon steels, in tempers, grades, finishes and sizes to suit any needs.

Call on Mr. Tubes — your nearby B&W Tube Representative — if you want help in determining the mechanical tubing best suited to your needs. Get the benefit of his long, close association with mechanical applications of all kinds to help you cut costs while keeping production high.



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TA-1747(C)



Here's a practical "locomotive" for switching and spotting cars on your sidings — at a great saving in man-hours, plus increased safety and ever-ready convenience . . . at an operating cost of about 1 1/2 gals. of gasoline per hour!

A 25 hp. Model VF4 Wisconsin Heavy-Duty Air-Cooled Engine furnishes dependable power for all phases of HEMCO-MOTIVE operation . . . off-track mobility, climbing up and over the rails, operating the hydraulic lift that "couples" the unit to the car, and handling all switching and spotting maneuvers . . . delivering a 7400-lb. drawbar pull through 4-wheel drive, moving up to 3 loaded freight cars at a time, at a rail speed of 150 ft. per minute! Hemco Manufacturing Inc., Argonia, Kansas, is the builder. It's another typical Wisconsin Air-Cooled Engine original equipment application . . . again illustrating how these fine engines fit both the JOB and the MACHINE.



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(Continued from page 194)

to maximum depths of nine in., 18 in., and 24 in. Tracers with linkarm are intended for operation by means of a motor-driven Mototracer, but can be used for hand tracing if necessary. Tracers with stiffarm are intended for manual operation, but can be used with a Mototracer by attaching the stiffarm to a standard linkarm. All tracers can be used with any Profilometer amplimeter. *Micrometrical Manufacturing Co., Booth 1635.*

Circle 73 on page 81 for more data

### Carbide

The recently developed premium Grade 434 carbide will be on exhibit. This grade is for rough turning of all types of steel and armor plate. It has been used on centrifugally cast 309B stainless steel and is said to have good performance. Feeds ranging from 0.015 to 0.068 per revolution, and speeds from 68 sfpm to 600 sfpm have been tried giving extraordinary results in these ranges. The depth of cut used in these tests were from 1/8 in. to 1-1/4 in. *Adamas Carbide Corp. Booth 2550.*

Circle 74 on page 81 for more data

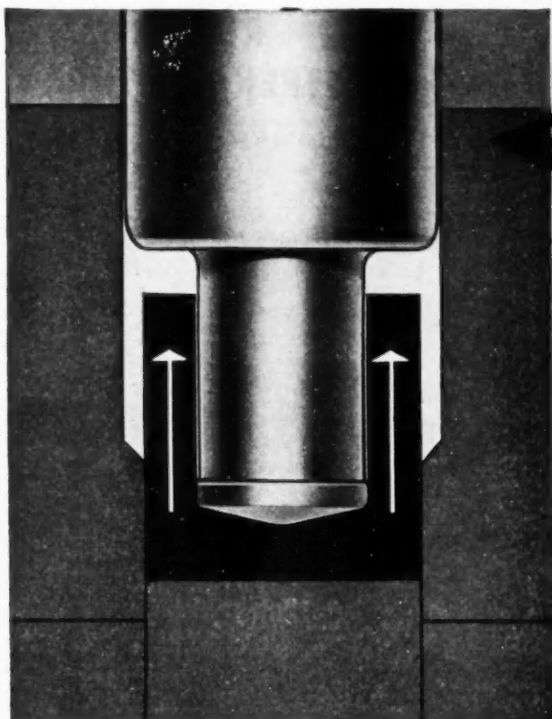
### Reducing Valve

An oil pressure reducing and regulating valve, for reducing high pressure to low pressure, will be shown. This valve is a single seated, spring loaded, direct acting diaphragm type. It automatically reduces high pressure to low pressure and maintains the low pressure regardless of fluctuations on the high pressure side.

It is constructed so any restriction forces the valve wide open with a self cleaning effect of the seat. The valve has a built-in strainer to safeguard working parts. The strainer also aids in surrounding the parts with a uniform temperature fluid to prevent sticking or seizing.

The valve has a large bottom plug that permits easy inspection and cleaning of parts. Worn parts may be replaced through this same opening. *Eclipse Fuel Engineering Co., Booth 1624.*

Circle 75 on page 81 for more data  
(Turn to page 198, please)



BACKWARD  
EXTRUSION

**Extrusions are easier...**

## **with BONDERITE and BONDERLUBE**

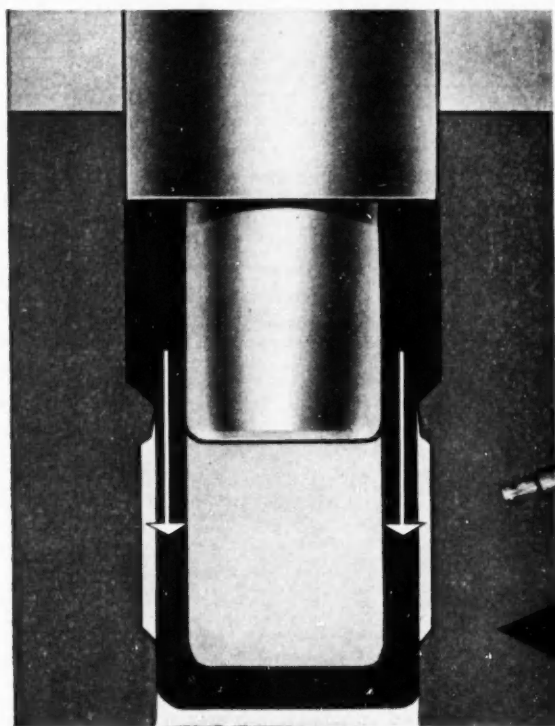
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FORWARD  
EXTRUSION



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aids in cold forming of metals

**PARCO COMPOUND**  
rust resistant

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RUSSIA'S  
STRENGTH TODAY

(Continued from page 176)

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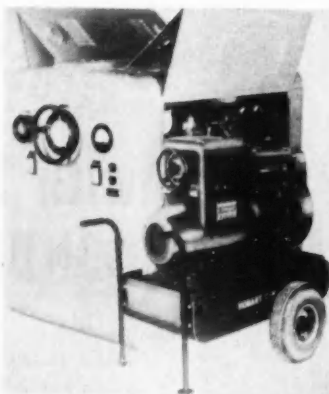
(Continued from page 196)

## Portable Welders

Two recently engineered aircooled gasoline engine driven arc welders will be on display.

One is a low-cost 200-amp d-c arc welder powered by a two-cyl Wisconsin aircooled engine. Measuring only 38 in. long, 21¼ in. wide, and 35-5/16 in. high, this unit is compact and lightweight for easy loading and hauling.

The other is a combination 200-amp a-c arc welder and five kw a-c power unit. By throwing its change over switch to "welder" it can be used as a 200-amp arc welder; throwing the switch to "a-c power" converts the generator into a single-phase, 110-v, 60 cycle power plant of five kw capacity. This unit is powered by a Wisconsin four-cyl aircooled engine.



Hobart portable welder.

Portable mountings are available for both models. Hobart Brothers Co., Booth 2577.

Circle 78 on page 81 for more data

# EF

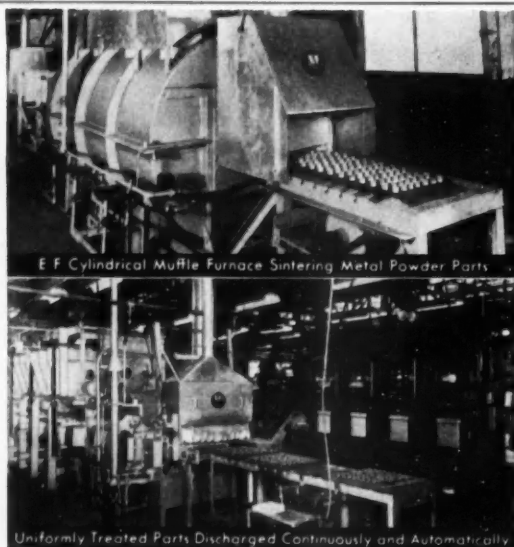
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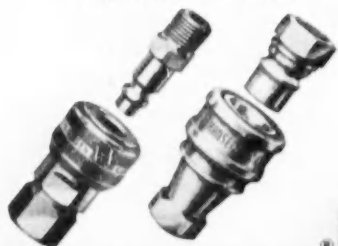
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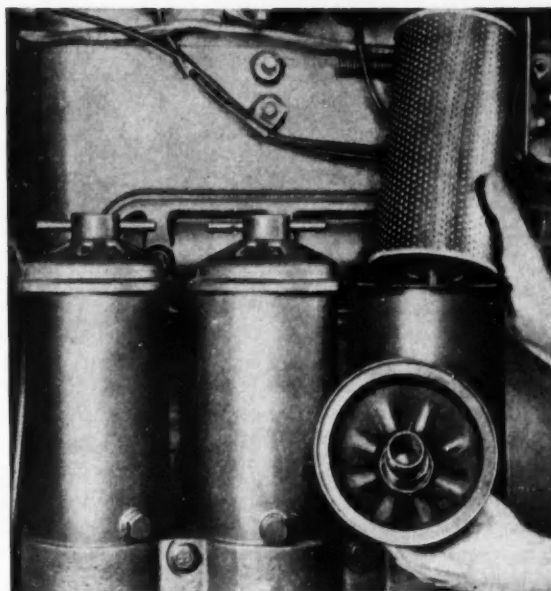


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The story's the same with gasoline engines, too! The world's best known producers of passenger cars, trucks, tractors, earth-moving equipment, and stationary engines have found Purolators best . . . and install them as standard factory equipment.

If you are contemplating new designs or modifications of existing ones, remember . . . there's a well-engineered and use-tested Purolator for *any* filter application, including fuel oil, gasoline, hydraulic fluid, and water. Write for the Purolator catalog issued for your special field.

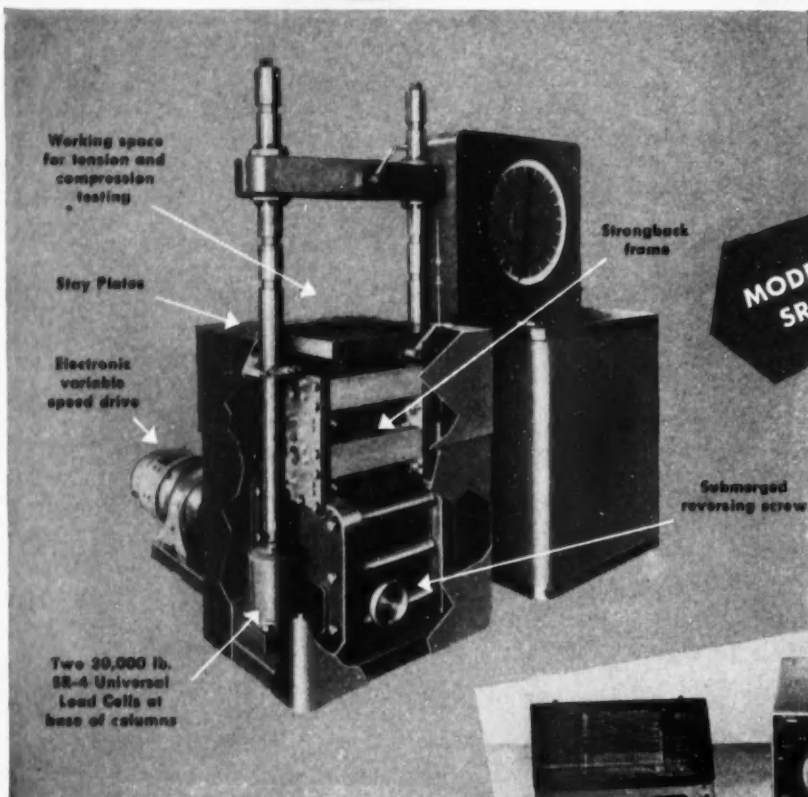


**Purolator Micronic Filters** in a typical Diesel full-flow installation. Although the Purolator Micronic filter elements measure only 4½ in. by 9 in., *each one filters 9 gallons of oil per minute*, giving a total of 27 g.p.m. for the complete filter unit.

**PUROLATOR PRODUCTS, INC.**  
Rahway, New Jersey, and Toronto, Ontario, Canada  
Factory Branch Offices: Chicago, Detroit, Los Angeles  
\*Reg. U.S. Pat. Off.

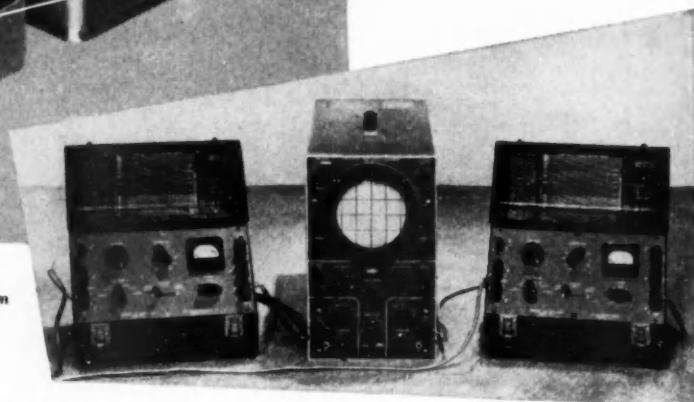


**NOW! A Machine Fast Enough for SHOCK Tests on Structures**



**MODEL FGT BALDWIN-EMERY  
SR-4 TESTING MACHINE**

Oscilloscope X-Y diagram system  
records stress-strain curves  
in shock testing



The extraordinary high speed of response of this revolutionary new Baldwin-Emery universal testing machine, paired with an oscilloscopic X-Y diagram, enables it to measure and record shock tests on complete structures. Its SR-4 load cells and SR-4 type extensometer make it capable of responding to the rates required by shock conditions.

The load cells and extensometer feed signals to the oscilloscope through pre-amplifier circuits. An instantaneous stress-strain curve and its two axes then appear on the oscilloscope screen. It is possible to

have this screen photographed continually to record changes in the shape of the stress-strain curve as the structure itself changes.

Its unique aptness for such shock tests is one of the reasons why the FGT SR-4 Testing Machine is being recognized as *the greatest advance in materials testing equipment in twenty years.*

Full details on this latest contribution of Testing Headquarters are in Bulletin 4202. For your copy, write to Dept. 3204, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.



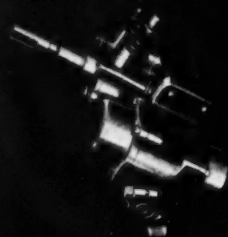
**TESTING HEADQUARTERS**

**BALDWIN-LIMA-HAMILTON**

General Offices: Philadelphia 42, Pa. • Offices in Principal Cities

# HYDRAGUIDE

HYDRAULIC  
POWER STEERING IS



## FULL TIME

Due to exclusive proportional valving, "HYDRAGUIDE" responds full time—to "variable load" . . . Plenty of road feel.

## SAFE

"HYDRAGUIDE" makes driver control easy when you hit holes, soft shoulders, or have a blowout or flat.



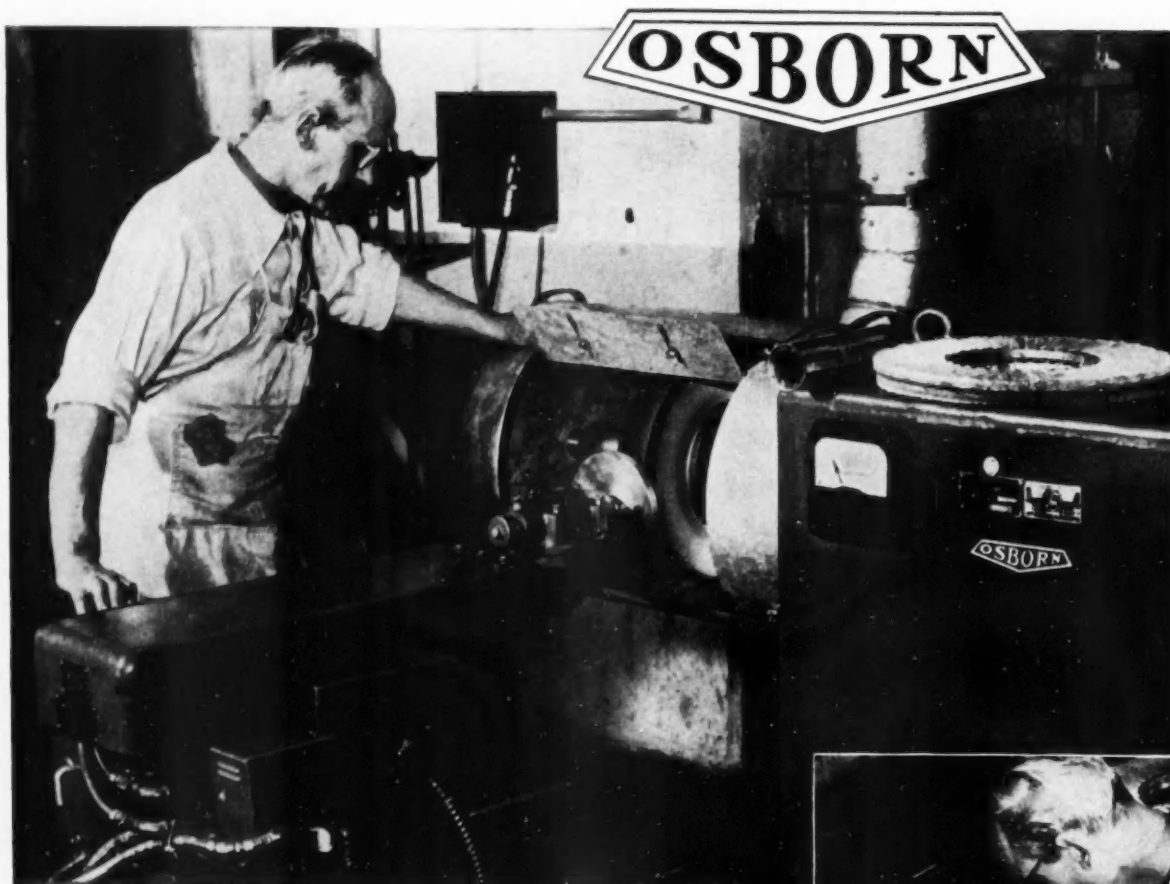
## PLEASURABLE

"HYDRAGUIDE" provides a new pleasure in driving.

BUILT BY  
**GEMMER**  
MAKERS OF THE FINEST  
IN STEERING

Gemmer Manufacturing Co., Detroit 17, Mich., pioneered easy manual steering 4 decades ago—pioneered "HYDRAGUIDE" Full Time power steering for automobiles in 1950.

INTEGRAL AND LINKAGE TYPES



## Burr removal time cut 50% with push-button brushing *plus greatly improved quality*

*Power Brushing* of transmission gears removes burrs and blends surface junctures automatically. It has paid off 5 ways for a large East Coast manufacturer of aircraft parts.

Their Osborn Brushing Machine produces a uniform required rounding of .030" to .090". It accommodates gears and splines of most types, internal and external. It is easy to adjust for small gear lots and production runs of from 15 to 5,000 pieces. It eliminates costly scrap. *And* less effective hand method time was cut almost 50%.

Production bottlenecks and ineffective finishing departments in *your* plant can be reduced, often eliminated, with Osborn Power Brushing methods.

Find out how you can cut *your* costs . . . improve your workmanship. For new bulletin, Automatic Deburring, call in your nearby Osborn Brushing Analyst for complete information, or write *The Osborn Manufacturing Company, Dept. E-10, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

# Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



Operator can set up in a few minutes. Work is power rotated against the face of the brushes. A pre-set timer controls length of the cycle and retracts the holder.



Old method of hand burr removal was inaccurate, costly and time-wasting.



smaller..

lighter..

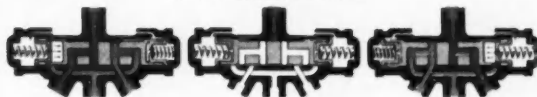
... and it does not leak



4 WAY PILOT VALVE



4 WAY SELECTOR VALVE



FLUID PRESSURE FROM THIS PILOT VALVE OPERATES THIS SLIDE-TYPE SELECTOR VALVE



General Controls AV-14 Series electrohydraulic selector valves guarantee positive control of high-pressure and high flow hydraulic systems. The pilot valve, balanced by opposing continuous duty solenoids, positions the selector valve by directing fluid to one end of the slide and returning it at the other. This double balance permits maximum efficient control with minimum current drain. Compact and light weight, with specially hardened and optically ground sealing surfaces that approach "zero" leakage. General Controls Hi-g selector valves provide leakproof control of all fluids at pressures ranging from 150 to 3000 psi. For complete information on the AV-14 Series, the AV-16 Gate Valve Series and Hi-g Limit Controls, send for your copy of Catalog 53A today.



**GENERAL CONTROLS**

Glendale, California • Skokie, Illinois

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

FACTORY BRANCHES IN 35 PRINCIPAL CITIES  
See your classified telephone directory.

**Standard Oil Company's Newest,  
Safest Aircraft Refueler is using**

**BERRY** *Rotodraulic*

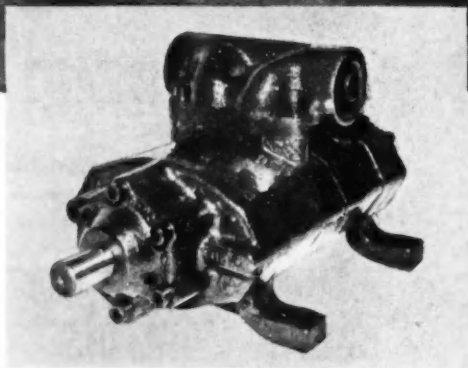


To better service today's larger multi-engined airplanes and overcome the fire hazard of gasoline engines, Standard Oil (Kentucky) designed a new kind of aircraft tender.

In a Berry hydraulic transmission, driven by power-takeoff, a new and safer way was found to drive the gasoline pump.

The hydraulically driven gasoline pump can deliver 300 gallons per minute from each hose. Hydraulic power operates a governor, permitting the driver to accelerate the engine from idle to desired speed with a button on the hose nozzle.

The small size, rugged construction, quiet



operation and long, maintenance-free life of the Berry unit made it the ideal solution.

Berry may be able to solve your pump or transmission problem, too. For full details, call your nearest Berry representative. Or write us for a catalog.

**BERRY**  
**DIVISION**



**OLIVER**

**Iron and Steel Corporation**

PITTSBURGH 3 • PENNSYLVANIA

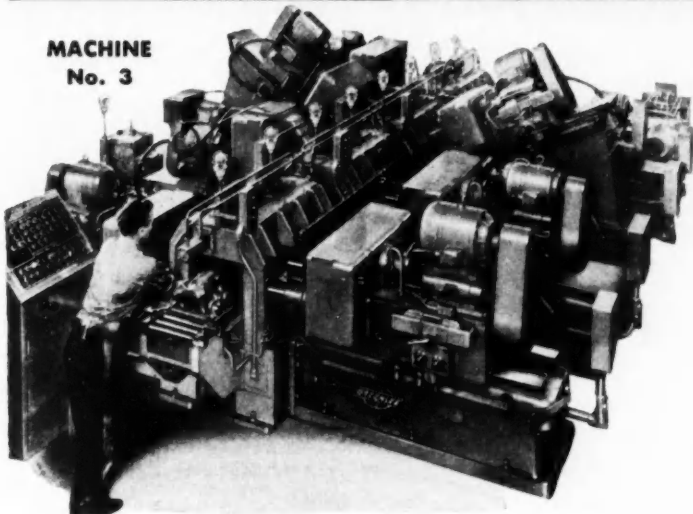
## 208 OPERATIONS IN 44.3 SECONDS

These recently-built Greenlee transfer machines mill, bore, drill, ream, and tap transmission cases for a well-known automobile. A total of 183 tools complete 208 operations in an automatic cycle time of 44.3 seconds. Features include face and end-milling heads, turnover and chip-cleanout stations, and indicator lights for tool changing. Self-contained hydraulic units conform to JIC standards for easy maintenance. These outstanding machines are among the newest built by Greenlee—a pioneer in progressive transfer-machine principles.



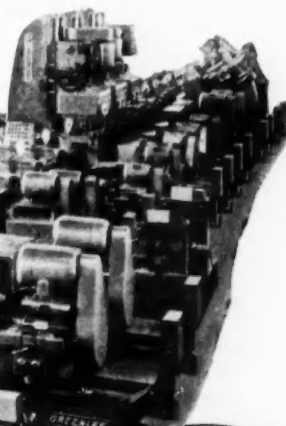
# GREENLEE

MACHINE  
No. 3

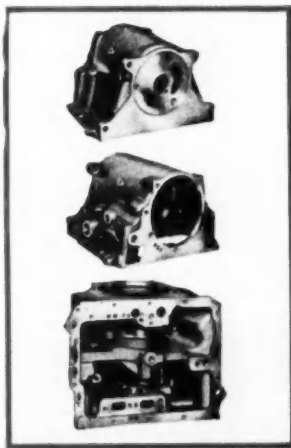
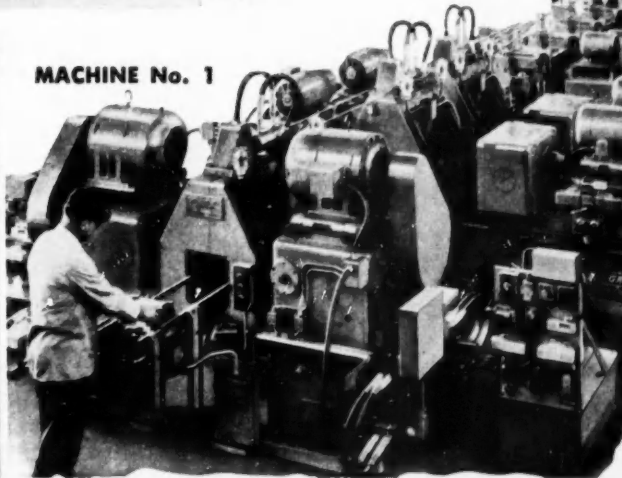


**TRANSFER MACHINES  
PROCESS  
AUTOMATIC  
TRANSMISSION CASES  
AT THE PRODUCTION RATE OF  
65 CASES PER HOUR**

MACHINE  
No. 2



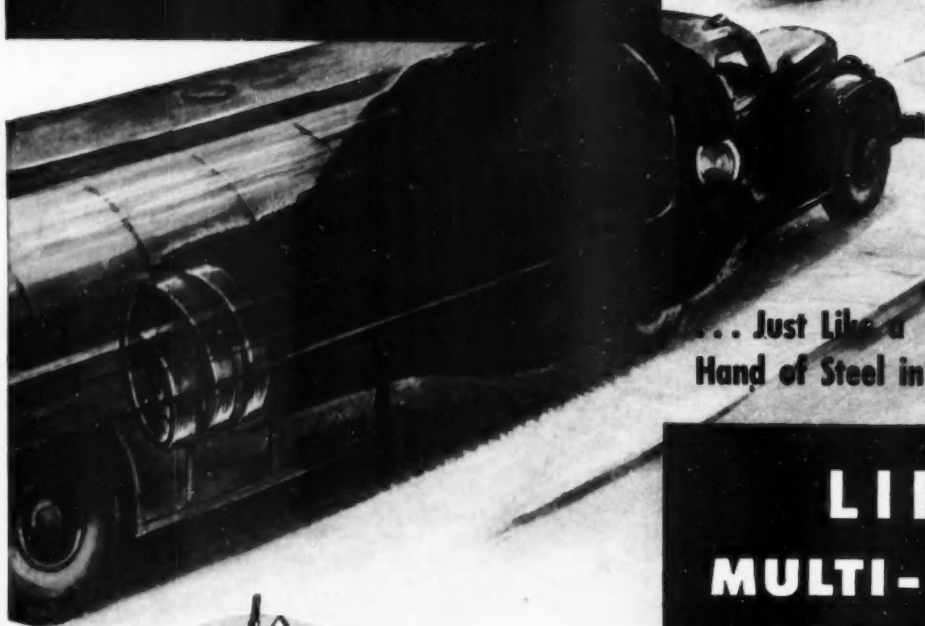
MACHINE No. 1



**GREENLEE BROS. & CO.  
1760 MASON AVENUE  
ROCKFORD, ILLINOIS**

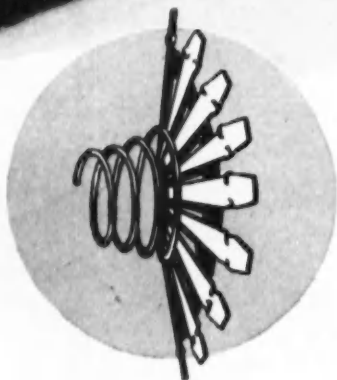
MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

# The **SOFT** Acting Clutch with the **SURE GRIP!**



... Just Like a  
Hand of Steel in a Velvet Glove

## **LIPE MULTI-LEVER CLUTCH**



The hand of steel in the Lipe Clutch has 20 fingers that equalize the pressure of a single spring—assuring softer engagement and a positive grip.

Lipe's soft engagement, positive grip Multi-Lever Clutch never needs babying. It engages smoothly—without grab, shock or jerk. All parts of the pressure plate touch at the same instant with the same pressure. No cocking—no point of high slippage and spot burning.

Result: More mileage between tear-downs.

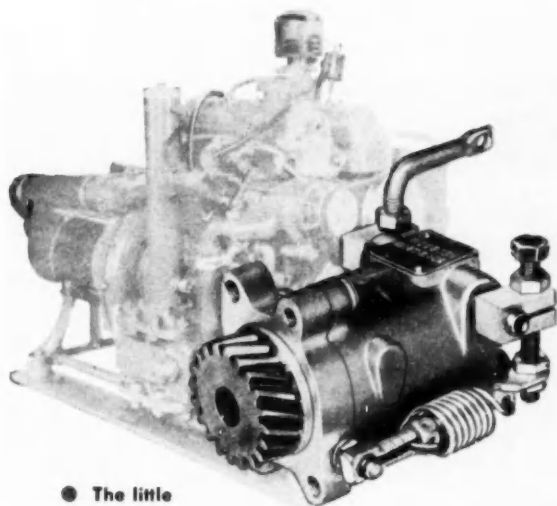
Write for Service Manual and complete data on genuine Lipe parts—stocked in principal cities.



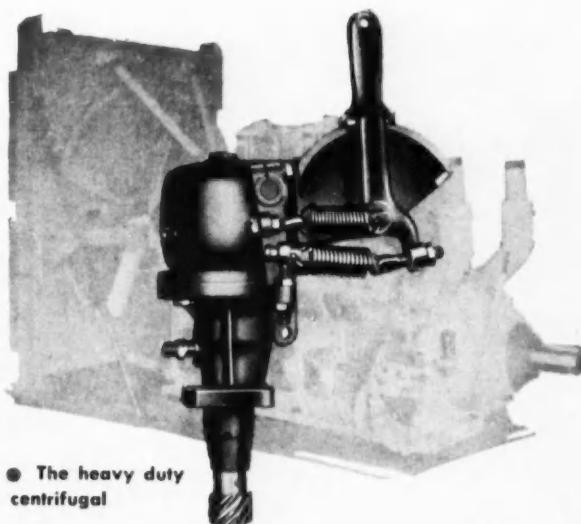
### *Lipe* - **ROLLWAY CORPORATION**

Manufacturers of Automotive Clutches and Machine-Tools  
Syracuse 1, N. Y.





● The little 1400 series



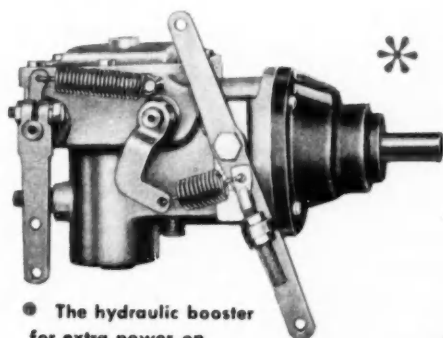
● The heavy duty centrifugal

## **PIERCE** GOVERNORS

preferred for gas (LPG), gasoline and diesel industrial engines...  
big, medium and small



● The standard long range 900 series



● The hydraulic booster for extra power on racks and valves

Pierce centrifugal governors are your most dependable and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster\* (for original equipment only) is ideal! Pierce offers a ready solution to most engine governing problems . . . send full details and specifications on your particular problem. Complete engineering service available.



**THE PIERCE GOVERNOR CO., INC.**  
1602 OHIO AVENUE, ANDERSON, INDIANA

"World's Most Experienced  
Governor Manufacturer"

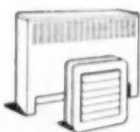


FASTEST THING IN FASTENINGS®



## SPEED NUTS Saved 6,144 Assembly Hours, Thousands of Production Dollars

*Reports the Trane Co., LaCrosse, Wisconsin*



"Every time we use a SPEED NUT, we save 14 seconds in production time", say Trane engineers. In one year, this leading manufacturer of air conditioning, heating and ventilating equipment netted 6,144 extra assembly hours, plus amazing savings in materials and materials handling. Misalignment of ventilator weld nuts and mounting holes slowed production continuously. Replacing them with "U" type SPEED NUTS, which snap in place by hand and provide floating alignment, ended this bottleneck. Costly installation of convector heater coil headers was overcome with "J" type SPEED NUTS. Snapped directly on frame members, they eliminated eight cast iron drilled and tapped ears and two welded support brackets. SPEED NUTS, applied after painting, eliminated masking or retapping of threads—licked rust problems.

Call in your Tinnerman representative for a FREE fastening analysis of your product . . . he may find comparable savings for you through greater fastening efficiency.



"U" TYPE

"J" TYPE

### SPEED NUTS®

are one-piece, self-locking, spring steel fasteners. Snap over panel edges or center hole locations . . . self retained in screw-receiving position for easier, faster assembly in "blind" locations. Available for a full range of screw sizes and panel thicknesses.

Send today for your copy of "SPEED NUT Savings Stories", a booklet of savings for industry. Write: TINNERMAN PRODUCTS, INC., Box 6688, Dept. 12, Cleveland 1, Ohio. In Canada: Dominion Fasteners, Ltd., Hamilton, Ontario. In Great Britain: Simmonds Aero-accessories, Ltd., Treforest, Wales. In France: Aeroaccessories Simmonds, S. A.—7 rue Henri Barbusse, Levallois (Seine).



TINNERMAN

**Speed Nuts®**

MORE THAN 8000 SHAPES AND SIZES



# Synchronized Power

**writes earth-moving success story**



One of Roy Kohl's five scrapers hauling a 24-yard load at Lockbourne Air Force Base. On this 212,000-yard job, the scrapers load in 90 seconds and travel to the spreading site at 30 mph.

In 1949, Roy Kohl was a basement excavating contractor in Ohio. During the last four years he has changed his operation and has moved more than 2½ million yards of ore, earth and clay on many types of big jobs.

His success story is built around the operation of 5 tandem-engine Euclid scrapers. The tandem-engine application—one pulling and one pushing—was made possible by Allison TORQMATIC DRIVES which synchronize the power of both engines through a simple control.

Kohl, like other operators, has found that Allison matched Torque Converters and hydraulic Transmissions contribute many ways to the more successful use of heavy-duty equipment. Most important, of course, is the ease

of operation; the engines' ability to work at peak efficiency; and the cushioning effect which eliminates harmful shock on engines and the entire drive line.

Kohl reports his "Eucs" operate under all conditions, and climb up to 50% grades under full load. The five units now average over 2,000 hours a year. His first scraper moved more than a million yards without any major maintenance on Converter or Transmission.

Your dealer can give you more information about low-cost equipment maintenance where Allison TORQMATIC DRIVES are installed or you may wish to write Allison direct for full particulars.

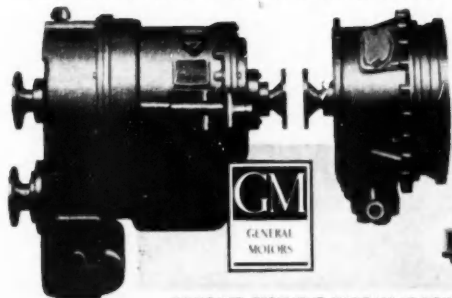
**ALLISON DIVISION OF GENERAL MOTORS**  
Box 894AA, Indianapolis 6, Indiana

## **ALLISON TORQMATIC DRIVES**

*Unbeatable Team for Maximum  
Operating Economy*

- \* Quick-shifts at full throttle with fingertip hydraulic control.
- \* Holds power to load at all times—no clutch pedal to push—no gearshift guess.
- \* Cuts maintenance cost by absorbing shock—eliminates engine lugging—prolongs equipment life.
- \* Only torque converter-transmission team designed to work as a unit and built by one manufacturer.

FIRST MATCHED UNITS BUILT BY ONE MANUFACTURER.



## *Allison* **TORQMATIC DRIVES**

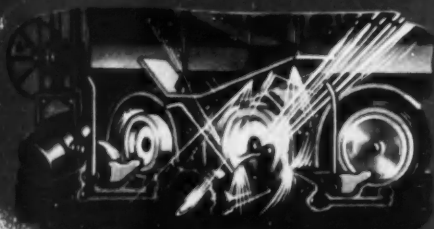


COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS • TRACTORS • SCRAPERS • SHOVELS • DRILLING RIGS

# ***KELSEY-HAYES***



*Molten iron is centrifugally cast inside a one-piece steel shell for greater safety in Kelsey-Hayes drums.*



*Wheels, Brakes, Hubs and Drums . . . also Parts for Farm Implements and Aircraft*

## **KELSEY-HAYES WHEEL COMPANY**

**DETROIT 32, MICHIGAN**

**PLANTS IN DETROIT AND JACKSON, MICHIGAN; McKEESPORT, PA.;  
LOS ANGELES, CALIF.; DAVENPORT, IOWA; WINDSOR, ONTARIO, CANADA**





# Salvage of rejects speeded by new metallizing alloy

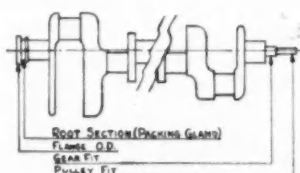
## outwears old bearing material 25 times

**Automotive manufacturers replace chrome plating installation with metallizing for salvage of mis-machined crankshafts; step up output to 10 per hour**

Sprabond Wire, the new self-bonding metallizing alloy, is speeding reject salvage in a wide range of production applications. It has been found particularly valuable in building up parts which have been machined undersize, or damaged by tool marks. Resulting surfaces are extremely hard and, due to their microscopic pore structure, tend to hold considerable amounts of oil. These factors produce excellent wear characteristics, some users reporting increases in service

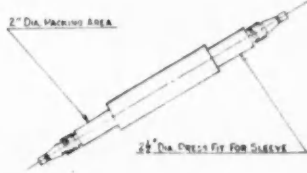
life as much as 25 times that obtained in any other way.

Application is simple and fast; only 3 operations: (1) the part is cleaned or undercut; (2) Sprabond Wire applied; (3) the surface finish-ground. Dovetailing and undercutting often not required and build-up can be carried to a feather edge. No danger of warpage because negligible heat is generated in the part during spraying.



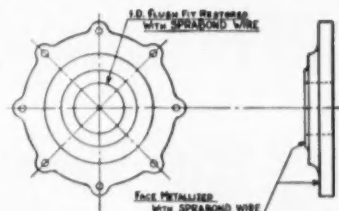
### Better and faster than plating

Sketch shows automotive crankshaft of the type being reclaimed in quantity by large manufacturer. These parts were formerly reclaimed by plating, which was slow and expensive. With metallizing, however, production rate is 10 shafts per hour.



### Where welding is impractical

Heat warping and consequent straightening costs made welding impractical for salvage of blower shafts such as shown above. Shafts formerly scrapped and replaced are now rebuilt. With Sprabond Wire metallizing, saving is \$45.00 each.

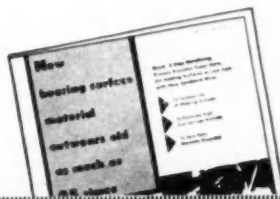


### Fits restored—no re-machining

Press fit in electric motor end bell is frequently lost through wear. Welding is impractical here, too, because of warpage. But a few thousandths of Sprabond Wire on the I.D. builds a press fit so that even minimum grinding is often unnecessary. Savings per end bell—about \$30.00.

### Some other money-saving applications for the Sprabond Wire process

Cracked blocks and castings—flat surfaces—molds, patterns, match plates—sand holes  
thin sections—lathe ways—inside diameters—gas holes.



**FREE** Metco Bulletin 57B describes the advantages of the Sprabond Wire metallizing process in detail. Micro-photograph of Sprabond Wire coating on steel shows how it works. Use the coupon to send for your free copy today. No obligation, of course.

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO®, SPRABOND WIRE. \*Reg. U. S. Pat. Off.

Don I. Watson  
Metallizing Engineering Co., Inc.  
38-14 30th St., Long Island City 1, New York  
Please send me Bulletin 57B.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

**METALLIZING ENGINEERING CO., INC.**

38-14 30th STREET

LONG ISLAND CITY 1, N. Y.

In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chobham near Woking, England



## For the long haul ... Autocar relies on RB&W bolts

### Famous truck builder rates them best for ease of assembly and accessibility

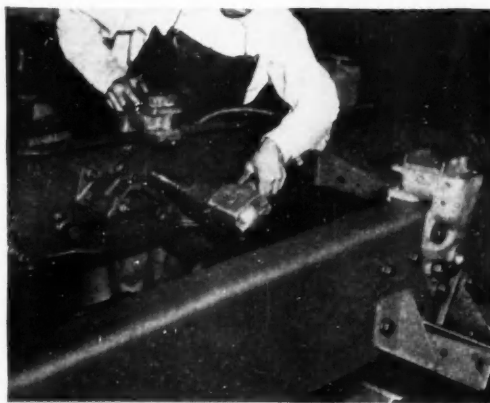
It's been a long time since the Autocar people switched from riveted to bolt-and-nut construction. Here's how it happened:

Two Autocar engineers took off on a coast-to-coast run to shake the bugs out of a new test model. Things went well until a riveted spring bracket broke. It took an entire day just to chisel through the rivets because it was hard to get at the bracket.

From that day on, it was *accessible* bolt-and-nut construction exclusively for all Autocar trucks. And Autocar standardized on RB&W bolts. One dividend from using these rugged bolts is that Autocar can specify higher-strength material than is practical for riveting. Furthermore, tests on structures like bridges show that rivets frequently loosen. This doesn't happen to bolts on Autocar frames.

Where you want to join structural members firmly together so they'll stay together for good, high-strength bolting is often your best bet.

As the leading manufacturer of all kinds of fasteners, we're in the unusual position of always being able to recommend and supply the right ones for all your needs. Write to RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N. Y.



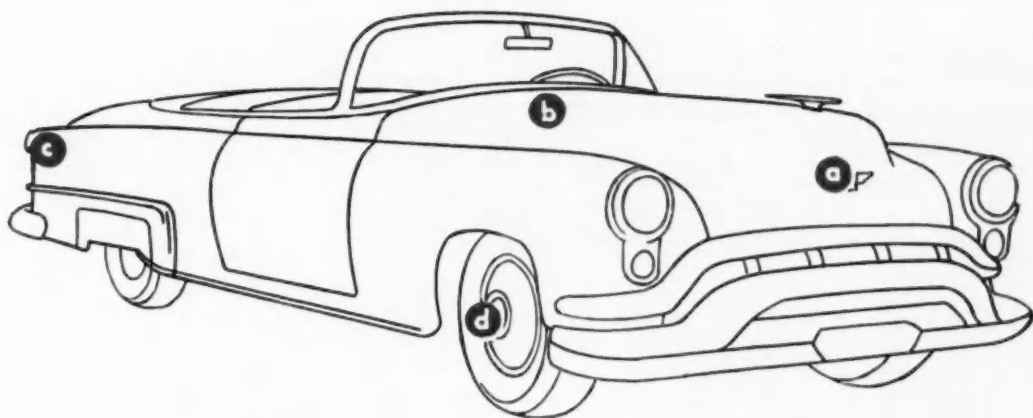
**FASTER FASTENING** is achieved in the Autocar plant at Ardmore, Pa., by using air tools like the one shown here to run up RB&W nuts on RB&W bolts on an Autocar truck frame. In addition to making tight, accessible joints, bolting effects substantial assembly savings.

3.1



**108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG**

Plants at: PORT CHESTER, N. Y., CORAOPOLIS, PA., ROCK FALLS, ILL., LOS ANGELES, CALIF. Additional sales offices at: PHILADELPHIA, PITTSBURGH, DETROIT, CHICAGO, DALLAS, SAN FRANCISCO. Sales agents at: PORTLAND, SEATTLE. Distributors from coast to coast.

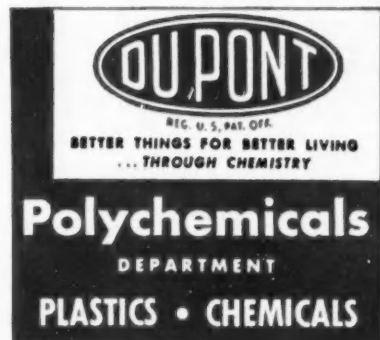


## A proven material for automotive styling... **DU PONT** **LUCITE** \*

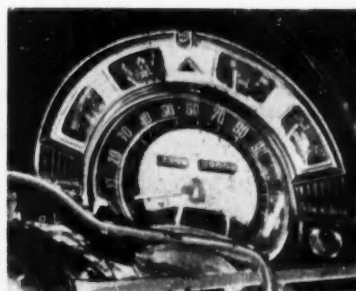
Forward-looking engineers are finding in Du Pont "Lucite" acrylic resin the combination of properties that makes possible many of their new designs in improved styling. Beautiful "Lucite" offers optical clarity, outdoor durability, shatter-resistance, strength and unique "edge-lighting" properties.

A few of the many examples in which these properties have been put to use are shown. Perhaps Du Pont "Lucite" and other members of the Du Pont family of plastic engineering materials can help you blueprint your ideas for the future. For full information, write: E. I. du Pont de Nemours & Co., (Inc.), Polychemicals Department, Room 1710L Du Pont Bldg., Wilmington 98, Delaware.

\*REG. U. S. PAT. OFF.



**a** HOOD AND TRUNK MEDALLIONS show the beautiful three-dimensional color effects that can be obtained with durable "Lucite." In normal use Du Pont "Lucite" is unaffected by gasoline or lubricants.



**b** INSTRUMENT-PANEL FACES are easy to read when made of sparkling "Lucite." Du Pont "Lucite" has excellent light-transmission characteristics... can be used to "edge-light" and "pipe" light around curves for greater lighting efficiency.



**c** TAIL-LAMP LENSES of "Lucite" combine eye-catching beauty with outstanding optical properties. "Lucite" may be molded in intricate shapes. It is strong and shatter-resistant... has good dimensional and color stability.



**d** HUB-CAP EMBLEMS inset with gleaming "Lucite" add a touch of distinctive styling that customers appreciate. Durable "Lucite" insures lasting beauty despite close-to-the-road service and constant exposure.



## The Alchemy of Light

Far surpassing in importance the transmutation of metals, for which the ancient alchemists strove, is the modern transformation of light to a useful force.

Television, like so many other great advances, rests on the utilization of a basic natural law: in this case that the element selenium, when exposed to light, generates an electric current.

*It's great to have an idea. It's much more wonderful to make it work. That's where we come in.* Many of today's greatest ideas have been made to work only by inclusion of the correct Sirvene part.

Sirvene is not a single product or formula. Highly versatile, it is the "personalized" compound of oil resistant elastomers (synthetic rubber), and the special design of the molded flexible part essential to the satisfactory operation of a critical mechanism. Such as yours.

The time to call in our experienced Sirvene engineers is when your project is on the drawing board. Then we can work with you to develop the Sirvene unit that will possess the exact degree of flexibility or hardness, with correct resistance to extreme temperatures, pressures, fluids, gases, abrasion, and wear. This

part may also need to be bonded to other materials.

Once the correct formula is developed, Chicago Rawhide produces, in quantity, the resulting custom-built part, under strict laboratory control.

The monograph "Engineering with Sirvene" will be sent you free on request. Your correspondence is cordially invited.

*Sirvene products include diaphragms, boots, gaskets, oil seals, washers, packings and similar molded parts.*

### CHICAGO RAWHIDE MANUFACTURING CO.

1310 Elston Avenue SIRVENE DIVISION Chicago 22, Illinois



# SIRVENE

SCIENTIFICALLY COMPOUNDED ELASTOMERS

### SIRVIS MECHANICAL LEATHER PRODUCTS

Gears, diaphragms, packings and other products that give dependable service under difficult operating conditions.

### PERFECT Oil Seals

More automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device.

Representatives in these Principal Cities:  
Boston • New York • Syracuse • Buffalo  
Philadelphia • Pittsburgh • Cincinnati • Cleveland  
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Houston • Los Angeles • San Francisco



Another typical

*Morris*

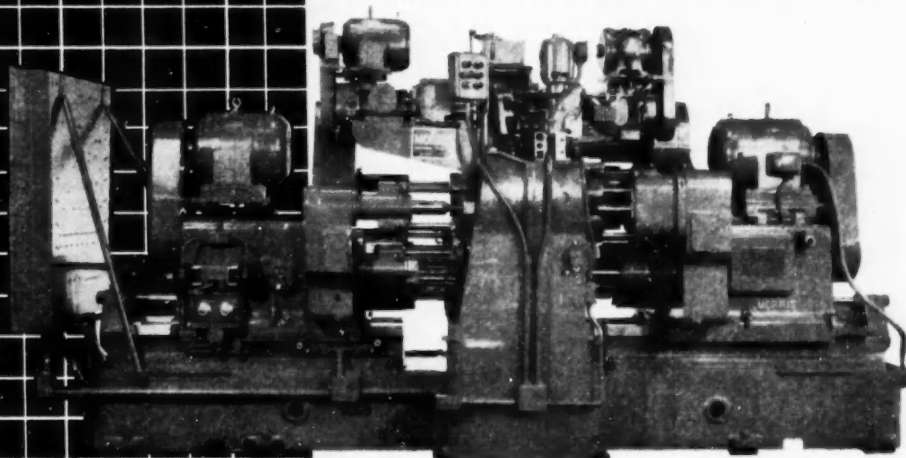
MOR-SPEED  
production machine  
performance record

**35% SAVINGS IN LABOR**  
**REPLACES 6 OLDER MACHINES**  
**PAYS FOR ITSELF IN 9 MONTHS**

The two way horizontal, eight station, automatic indexing machine illustrated drills, reams, countersinks, forms radius and taps 187 refrigeration unit cylinders per hour.

This unit is equipped with nineteen drilling spindles, fourteen countersinking spindles, four counterboring spindles, one reaming spindle and eleven tapping spindles. Twenty spindles are in the left hand head and eighteen in right hand head.

If your work requires numerous operations on a mass production basis, consult us. Our engineers are eager to serve you.



**OPERATIONS PERFORMED:**

Drill, countersink and tap 8,  $\frac{1}{4}$ "—28 tap holes

Drill, ream and chamfer both ends of  $1\frac{1}{8}$ " hole

Counterbore for  $\frac{5}{8}$ " dia. segment

Drill, countersink and tap 1— $\frac{5}{16}$ " tap hole

Drill, countersink and tap 2— $\frac{3}{8}$ "—24 tap holes

\*Refrigeration Unit Cylinder



*Morris*

THE MORRIS MACHINE TOOL CO.

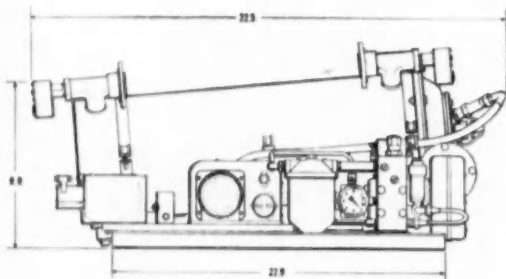
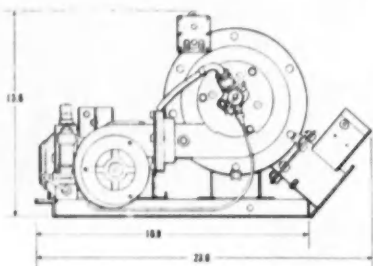
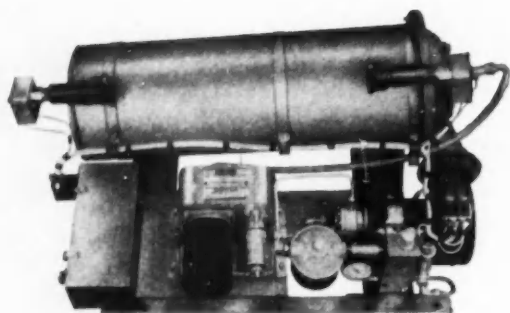
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operation	diesel oil, gasoline, or jet fuel
weight	80 lbs
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fuel input (continuous operation)	less than 1 gal/hr at rated output
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Thousands of military vehicles have proved that Janitrols *do* the job. "U.R.s" are virtually non-existent—proof of field dependability. "One shot" acceptance on installation qualification tests . . . Janitrol liquid heaters passed every one the first time . . . further proof of Janitrol manufacturing dependability.

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Extra heat transfer area, coolant container walls exposed to radiant and convected heat. Sealed in whirling flame combustion chamber plus counter-flow coolant travel result in top heat transfer efficiency.

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"Demand" operation (fully automatic cycling) conserves fuel, means longer heater life. 90,000 Btu/hr output, maximum (continuous full capacity operation) fuel consumption less than one gal/hr.

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## NATIONAL OIL SEAL LOGBOOK

Write our Redwood City office for reprints of this Logbook page

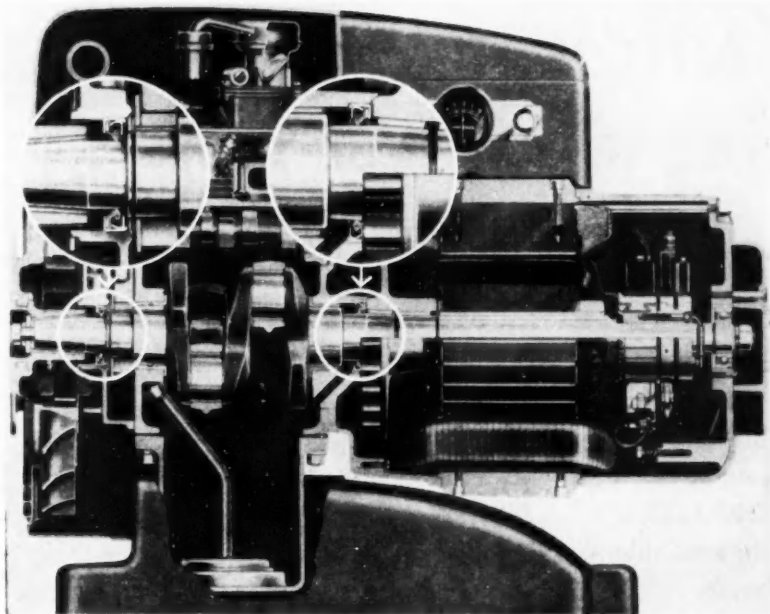


Fig. 1. Onan 305CK Electric Generating Plant

### "Zero leakage" crankshaft sealing in Onan two-cylinder generator engine

The four-cycle "CK" gasoline engine used in Onan generator sets employs two pistons which move in and out at the same time. This creates a pulsating pressure in the crankcase which together with a speed range of 600 to 3,500 R.P.M. and an oil temperature range of  $-25^{\circ}$  to  $240^{\circ}$  F. results in a serious crankshaft sealing problem. Zero leakage is mandatory because of the flywheel magneto and electric generator at either end of the shaft.

Onan engineers found that ordinary seals that were tight enough to retain oil absorbed too much engine horsepower, heated up, cracked and leaked. The oil leak rejection rate in the Onan test room averaged 15%.

Installation of modified National 50,000-S Syntech\* (synthetic rubber) seals (Figure 2) returned maximum horsepower to useful load, eliminated hardening and cracking, cut test room



Fig. 2. National 50,000-S Syntech Seal

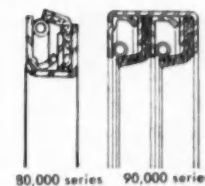
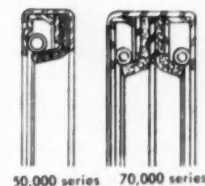
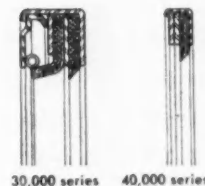
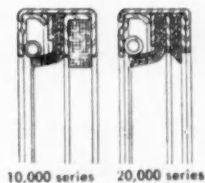
rejections to .05% and performed satisfactorily even after 5,000 hours. Seals used were conventional National designs with precision molded, trimmed and bonded Syntech sealing members. These seals have a low-friction sealing lip, accurately spring-tensioned.

National Applications Engineers can apply one of 2,500 standard-design National Oil Seals to your problem, or design special seals for special conditions. Call or write the nearest National office for information and engineering assistance.

\*T.M. Reg.

## Sealing News & Tips

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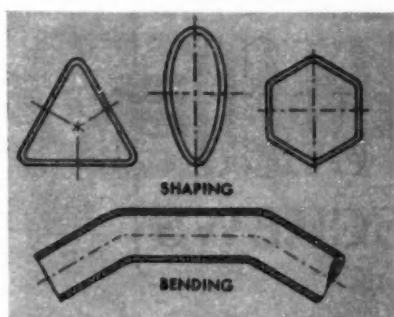
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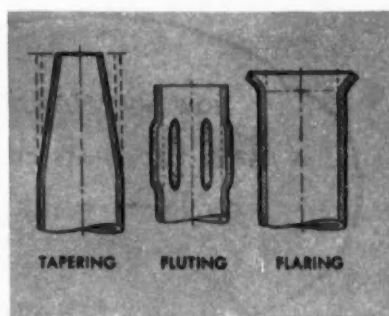
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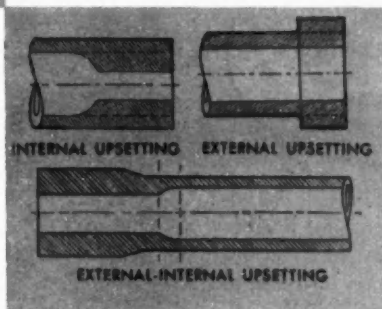




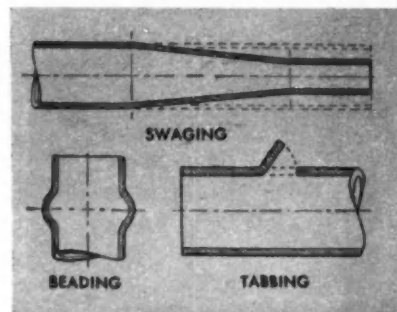
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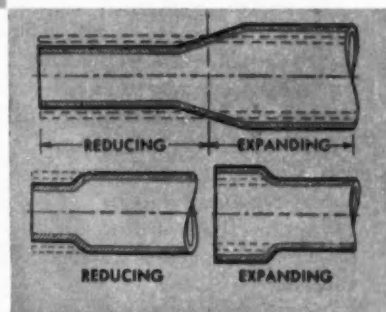
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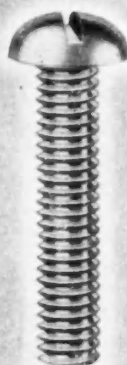
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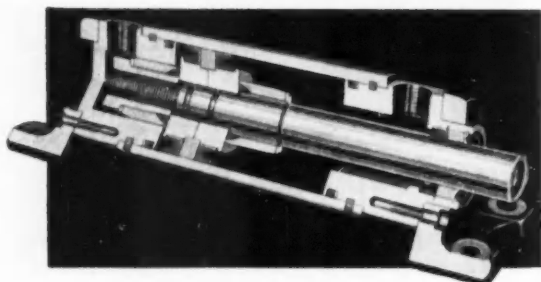
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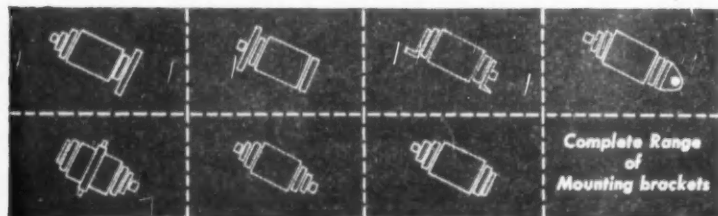


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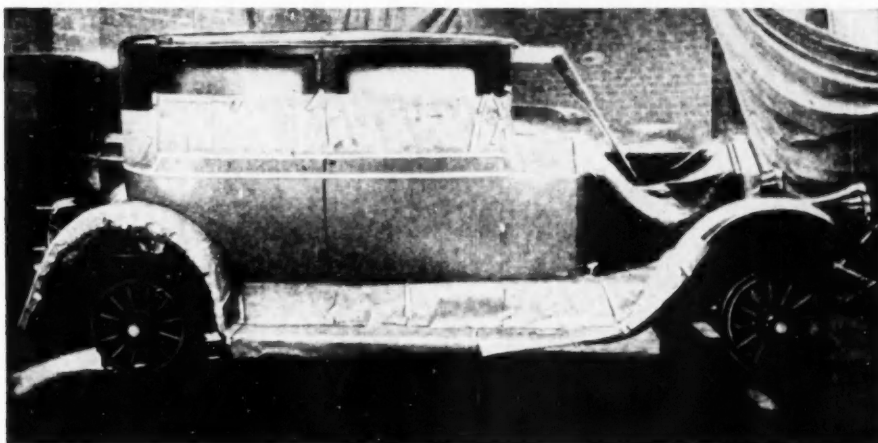
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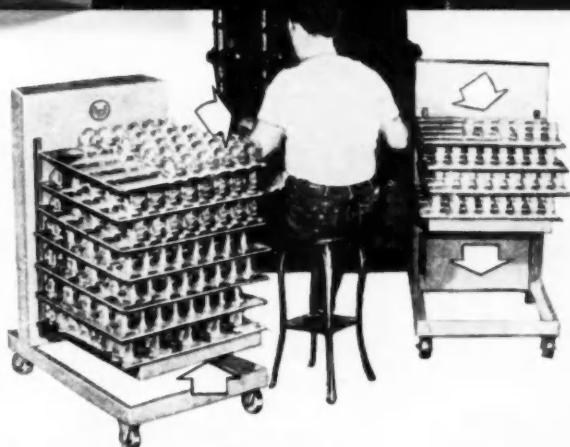
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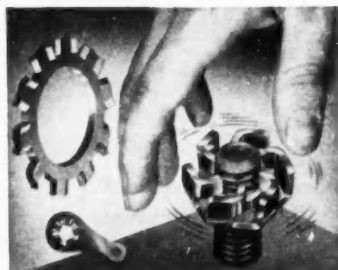
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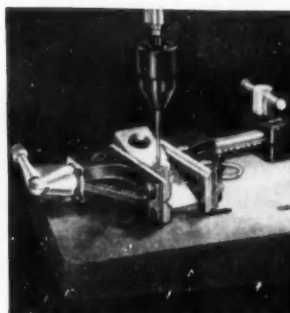
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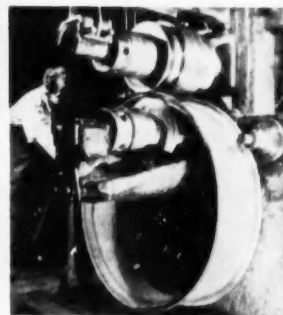
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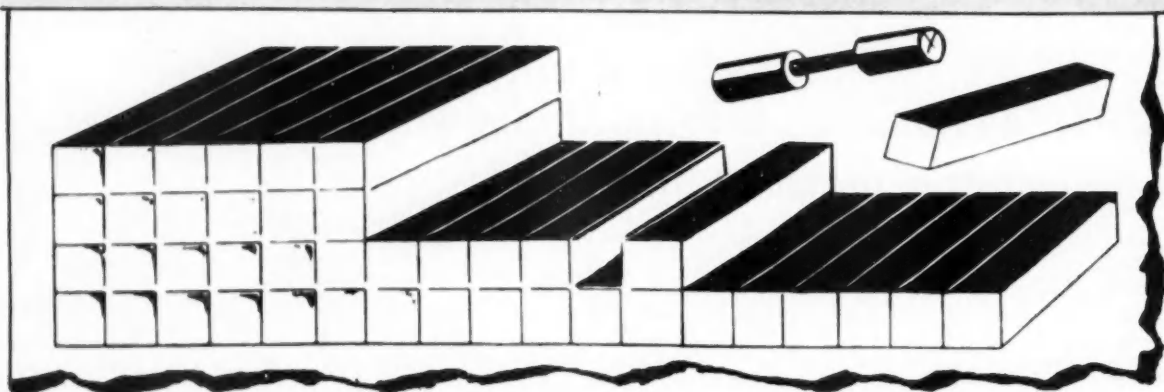


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Y.S.	22.5	20.0	21.2	20.6	20.5	22.0	20.8	21.0	21.8	22.5	23.0	23.4	23.0	25.0	23.8	22.5	23.5	24.6
T.S.	38.3	33.0	33.1	32.7	33.8	36.0	33.8	32.5	33.5	34.5	34.0	37.2	37.8	39.0	36.8	36.5	36.7	40.0
El.	12.5	10.0	6.0	4.0	7.5	7.5	8.0	7.0	7.0	7.5	7.0	8.0	8.5	8.5	7.5	8.0	7.5	10.0

SEPARATELY-CAST TEST BAR PROPERTIES				30	29	28	27	26	25	24	23	22	21	20	19
Nat. Aged 21 days	Y.S.	23500	Y.S.	22.0	23.0	22.5	21.5	22.5	23.5	22.5	23.5	23.5	23.8	22.8	23.8
	T.S.	36600	T.S.	36.3	35.3	35.3	35.0	35.0	37.3	34.5	32.0	32.5	32.5	35.0	38.3
	El.	7.5	El.	10.0	6.0	9.0	7.5	7.5	6.0	5.0	5.0	5.0	5.0	7.5	7.5

Properties of Casting (based on tensile strength readings)							31	32	33	34	35	36
Y.S.	Maximum	25,000	Minimum	22,500	Average	Y.S.	23.0	22.8	22.5	24.0	23.5	23.0
T.S.		40,800		32,500		T.S.	36.3	33.3	32.5	32.5	36.3	39.0
El.		11.0		5.0		El.	8.0	5.0	5.0	5.0	7.0	8.5

	42	41	40	39	38	37
Y.S.	23.3	23.7	23.0	23.2	23.0	22.5
T.S.	33.2	37.1	36.4	37.3	38.0	40.8
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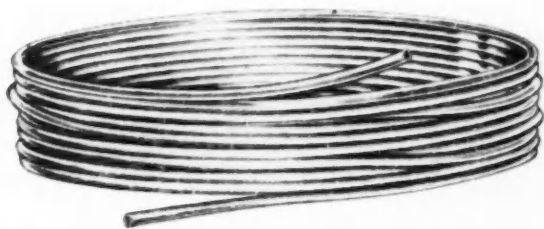


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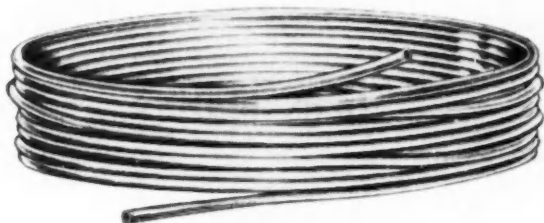




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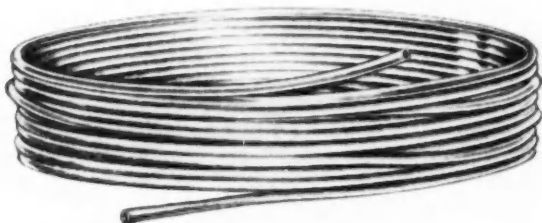


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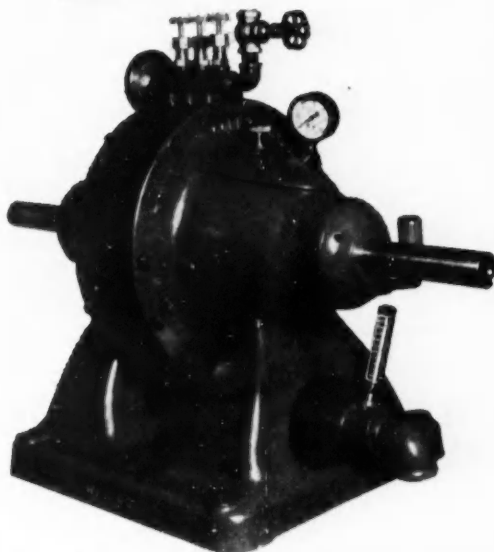
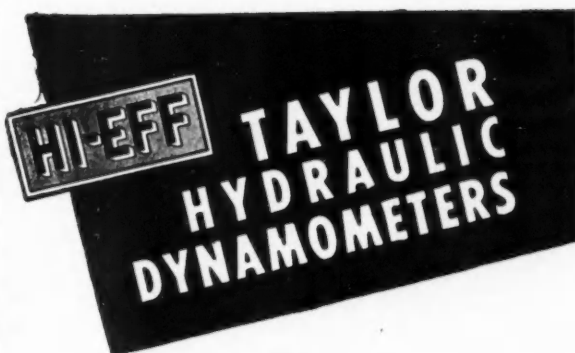
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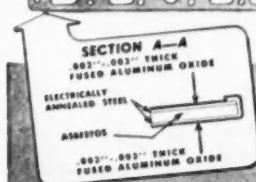
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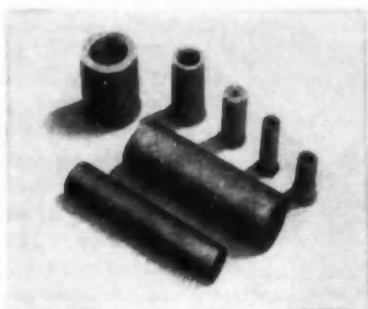


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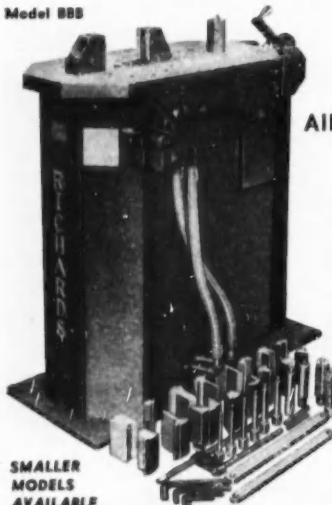
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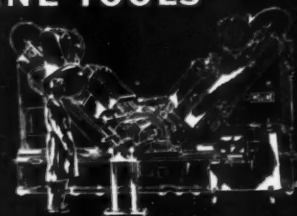
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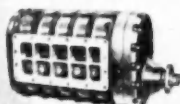
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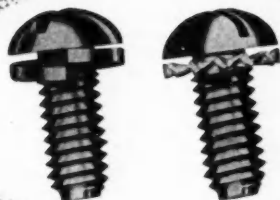
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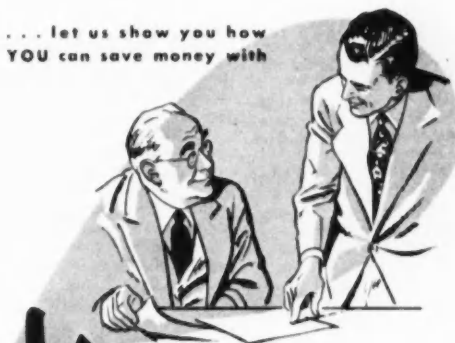
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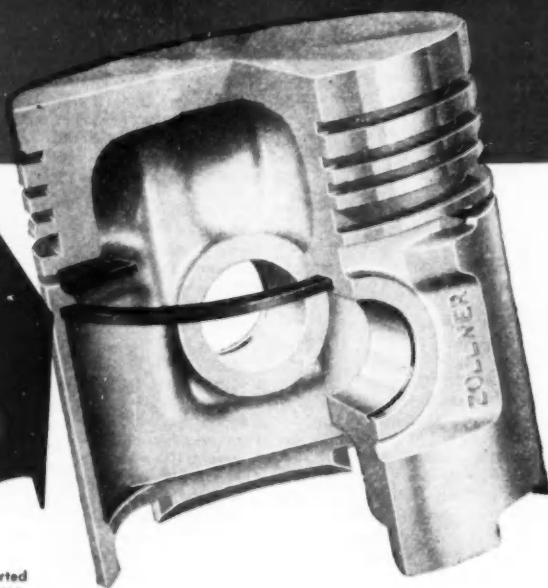
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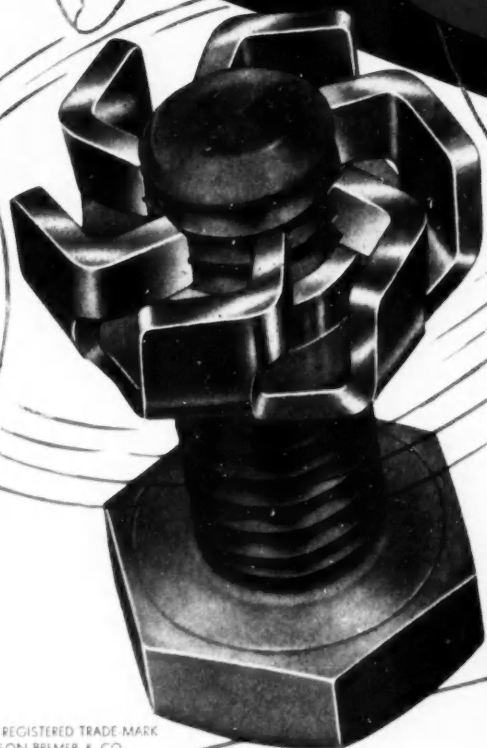
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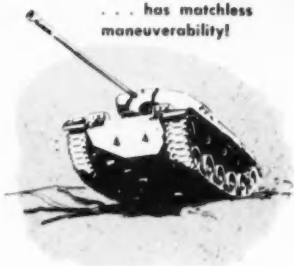
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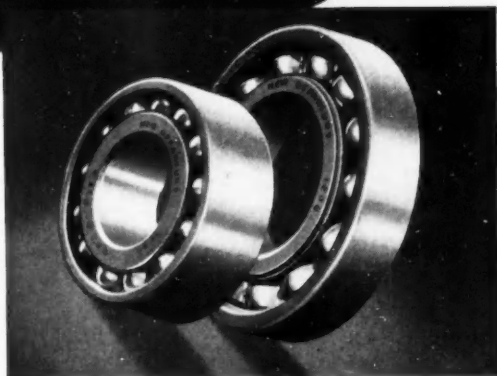
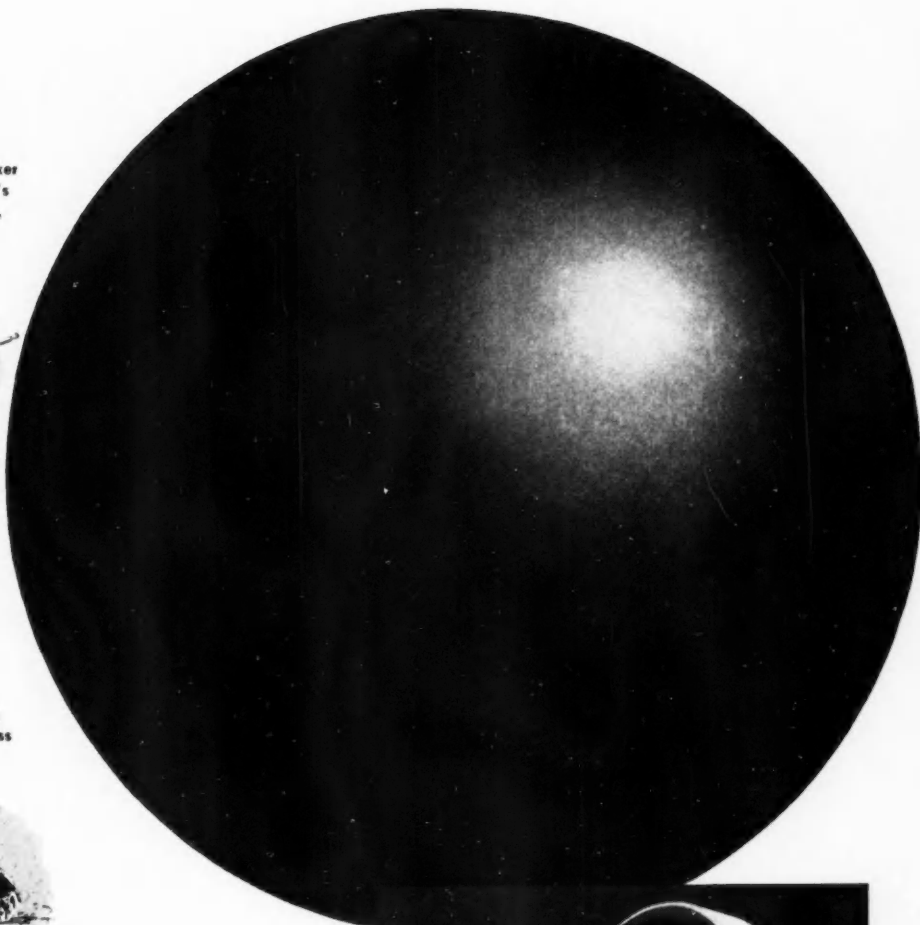



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